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CALIFORNIA RURAL LAND USE
AND
MANAGEMENT

A History of the Use and Occupancy
of Rural Lands in California

By

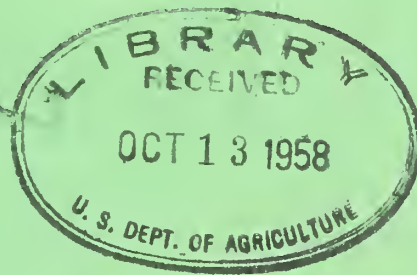
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and

S. B. Show

1944

United States Department of Agriculture
Forest Service
California Region



Chapter XIV Rural California at War
1942-43-44

Chapter XV California! What of the Future?

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CHAPTER XIV RURAL CALIFORNIA AT WAR
1942 - 43 - 44

WARTIME EXPANSION

Fremont's ragged warriors, tramping over rugged trails to gain the conquest which was to add the thirty-first star to the flag of freedom, could not have imagined the California of today. All over the State in the war years scores of military and naval establishments were training the flower of the nation's youth to become defenders of the democracy.

Less than a century had elapsed since Fremont's irregulars made their epoch-making march to victory- and one hundred years is a comparatively short space of time in the life of a state or nation - yet, the changes over the State's terrain, again dominated by war's influences, were far beyond any possible conception of the military conquerors of California. Swift transportation, instantaneous communication, weapons and war machinery undreamed of by the soldiers of a previous era, were now commonplace in the Golden State, the jumping-off place for many hundreds of thousands of modern American warriors who must defend their country by a war waged half a globe's distance from their homeland.

In 1942, 1943 and 1944, California was a strange mixture of the pursuits of war and peace, interwoven in a complex pattern, with the sole basic objective of an all-out effort to win a global war. California offered varied terrain for all forms of military and naval training; twelve hundred miles of coast line, deserts almost unlimited in scope, rolling hills, mountain ranges of any degree of ruggedness, and vast forest and woodland areas. The California topography, in fact, furnished a fair duplication of almost any foreign country where our soldiers must do battle, added to a climate in which simulated warfare could be carried on practically 365 days in the year.

Then, too, the fact cannot be overlooked that California was extremely vulnerable to sneak enemy attack during the first months of our participation in the war and was none too well prepared to resist such an effort. This is a fact fortunately not taken advantage of except in a minor way by a foe who for years had been casting covetous eyes on this part of America. Because of this, it is not at all strange that our armed forces showed almost unbelievable speed in building and occupying extensive military cantonments and training grounds from Oregon to Mexico.

Hand in hand with military and naval training establishments were the immense war industries which even before Pearl Harbor had gained a firm foothold in the State. Airplanes and ships by

the thousands rolled off the assembly lines from the local factories and yards. Even in the smaller rural communities farms and fields blossomed almost overnight into subsidiary manufacturing centers, turning out a thousand and one of the smaller parts needed to complete the swarms of planes winging forth from the plants of Southern California, or the fleets of iron ships launched in the San Francisco Bay area. California set a new record in the production of ships of the air and ships of the ocean.

The war years marked another migration to the Pacific Coast. Hundreds of thousands of soldiers, sailors and war workers, it is safe to say, would never have set foot on California soil except for the advent of the great war. To members of the armed forces, California, more often than not, merely meant a sojourn of a few days, a few weeks, or a few months. To many of them, suddenly transported from East or Middle West to an environment of winter roses and orange groves, it brought an inner resolve to return and make a permanent home in California after the war had been won.

Incoming war industry workers were originally transients but, after a few months, planted their feet firmly on California soil. Following the example of the preceding Dust Bowl migrants, they made the definite announcement, "We are here to stay." A survey made in 1943 of the leading war industrial plants disclosed the fact that, in the different establishments, fifty to eighty percent of the workers intended to remain in California after the war ended and take their chances in a peacetime economy.

California's population was 6,868,065 in April 1940. By May 1, 1942 the figure had risen to 7,135,142 and a year later had increased by some 300,000 more. Estimates by the Bureau of the Census placed the State's population November 1, 1943 at 7,881,694, exclusive of an average number during 1943 of three-quarters of a million of armed forces personnel.

The greatest percentage of increase was shown by isolated Inyo county where thousands of interned Japanese had the effect of raising the population 122.7 percent. In Contra Costa and Solano counties, in the San Francisco Bay Region, the population increase was 117.7 and 102.8 percent, respectively; and in San Diego county the 1940 figures were exceeded 42.9 percent. Modoc county residents increased 63.7 percent, mainly from Japanese internees.

That not all of the increase in population in the industrial areas came from outside the State is proven by these official figures which show a trend from the more lightly-populated rural counties to the urban manufacturing centers. Twenty-five counties

showed a population loss. Mono county population dropped more than half; Sierra, Trinity, and Mariposa counties over forty percent. Alpine and Amador counties lost around one-third and Del Norte and Eldorado counties approximately one-fourth of their pre-war population. Several other counties lost in population numbers from ten to twenty percent. Swarms of newcomers settled in Los Angeles and adjacent counties where, because of heavy pre-war populations, percentage increase figures do not entirely tell the tale.

California's wartime production, largely implements of war and processed materials for the armed forces, continued to soar to almost unbelievable heights. Californians found themselves marching to a war for their very existence and at the same time enjoying an unparalleled prosperity. From June 1, 1940, when military and naval preparedness commenced to be a real issue, to January 1, 1944, the total war contracts awarded within the State amounted to the stupendous figure of \$16,662,666,000. Of this, \$14,767,241,000 represented supply contracts - ships, planes, ordnance and accessory supplies; \$848,626,000 covered industrial facility contracts designed to speed up war production, and \$1,046,799,000 was involved in military facility contracts such as the building of army camps, naval bases and training areas. Forty-three of the State's fifty-eight counties shared in these contracts, ranging from a mere \$60,000 in Madera county to over eight and half billion dollars in Los Angeles county. Twenty-seven of these 43 counties had contracts involving totals of more than ten million, so that the immense Federal war expenditures were pretty well distributed throughout the State.

The number of wage earners in industrial plants jumped from 428,000 in 1940 to 1,111,200 in 1943. Of this latter number, 41,000 were engaged exclusively in processing food products as against 43,600 during the preceding year. This indicated greater volume of output with a 17 percent reduction in the number of employees. Logging, sawmills, and planing mills employed 44,600 persons in 1942 and 39,600 in 1943. The demand for fighting men, in spite of fairly liberal occupational deferment made serious inroads on the numbers of people processing the products of forest and farm.

The income of the people of California, rural and urban, was \$5,578,000,000 in 1940; in 1942, \$8,735,000,000, and in 1943 it had grown to eleven billion dollars. Taxes kept pace with individual income increases, Federal, State and local taxes in 1940 taking 19.3 percent of the people's income, 25.5 percent in 1942 and 33.2 percent in 1943. The tax department of the California State Chamber of Commerce estimated that Californians would

pay \$3,660,000,000 in taxes during the tax year of 1943-44 - \$2,870,000,000 in Federal taxes alone, seven percent of the nation's total forty-one billion dollar tax bill. War costs big money, but Californians had ready cash on hand to pay.

California, itself, was tax-rich by 1943. The stream of money flowing into the State coffers during the tax year of 1942-43 was \$490,598,080. The two leading sources of revenue were the unemployment insurance tax, which amounted to over one hundred and forty-three and one-quarter million dollars, and the State sales tax which totalled over one hundred and thirty-five and one-half million. A lot of the money in the State treasury was available for post-war public works, and plans were under way early in 1944 to insure such use. It is interesting to note that the three percent sales tax, imposed on almost all commodities except food, had risen from a figure of approximately thirty-three and one-quarter million dollars in 1933, justifying its reduction to two and one-half percent. With wartime restrictions on transportation, the State tax on gasoline slumped from \$57,435,442 in 1942 to \$45,428,403 in 1943.

In California, as elsewhere in the nation, the wartime record of labor unions in general was none too good. Both in town and country, jobs went begging for man and woman-power, and even persons with serious handicaps found employers bidding for their services. Labor union agents and officials were active everywhere, in town and country, and in spite of restrictions imposed by the Government, wages soared to undreamed of heights as these agents held strikes and production holdups, to secure better pay and strengthen the position of the working man.

In the midsummer of 1942, while independent farmers were laboring in their fields from dawn to dark to meet food production goals, the highly-organized longshoremen loading this food on ships were still working the 30-hour week imposed by their union rules. The Federal War Labor Board invariably acted with promptness and dispatch and when appeals to the patriotism of American workers failed, the Government itself took over the operation of plants until differences were settled. In spite of "feather-bedding" of labor, the Government's hand bore down more firmly on the comparatively few radicals in the labor ranks, strikes became fewer and new workers more skillful.

Nevertheless, labor, now generally classified as "organized," was sitting on top of the world, as it were. By October of 1942 the average weekly earnings of factory workers in California was \$53.08 and there were often several members of the same family engaged in such work. High school girls donned welders' helmets

and after a brief training period earned \$60. a week. Negro farmhands or roustabouts, who had perhaps never made more than ten dollars a month maximum wages in their lives, were imported to work in war plants at \$10 to \$12 a day, with wives working alongside of them at probably an almost similar wage.

There was need of high taxes. Pockets lined with money, workers demanded plenty and of the best. Nationally, pre-war milk consumption was 342 pound per capita, eggs 300 per capita and chickens eight pounds per person. Wartime consumption rose to 400 pounds of milk, 347 eggs and 28 pounds of chicken per capita. Common laborers nonchalantly wore diamonds and drank high-priced liquors.

The wage earners of America, some ten percent of them in California, had 126 billion dollars to spend in 1943 as against 73 billion in 1940.

No one could question the wisdom of either wartime food rationing or ceiling prices on almost every used commodity or service. And in spite of the freely-used prerogative of free-born Americans to "pan" their public agencies and their Government officials from the President down, the bulk of the citizenry were firmly behind the work of such agencies as the Office of Price Administration and the War Labor Board even though, under the stress and strain of war, mistakes were sometimes made. Not all the bloated wages of war workers were wildly spent. Besides meeting its State quota in War Bond purchases, California banks in 1943 showed saving deposits of three billion and sixty million dollars, an almost 34 percent increase over 1939.

The Government agencies created by the needs of war fought black markets, excess spending and the threat of inflation.

American and Californians in general played, laughed and criticized their Government in the same breath that they worked, produced, fought, and carried on. In spite of curtailment of luxuries, California in wartime was still a land of plenty with a few personal inconveniences, it is true, but little actual suffering. The war must be won, and the same grit and determination which carried Fremont's pioneer soldiers to victory was, in the main, reflected in the fighting spirit of the Californians of a century later.

Farms, Farmers and Farm Problems

During war years the problems of California farmers have been many. Labor shortages, high wages and sometimes low prices; shortage of farm machinery; shortage of fertilizer, feed and seed; inadequate transportation; new wartime Government agencies requiring complete written reports; and in the face of all this, the demand that they step up their production to a much greater tempo to fill wartime food demands.

The American farmer has always been an independent character and the freeholders of California, still only two or three generations removed from the original pioneer cultivators of their lands, were no exception to the rule. It was perhaps fortunate that to meet depression recovery needs there had already been a considerable regimentation of agriculture. In spite of their protests against this, California farmers, loyal to the core, met the challenge of war - as later quoted production figures will show.

With trains and busses loaded to the doors by men coming and going to and from training camps; with ships loaded to the waterline with supplies for fighting forces overseas; and with thousands of jungle fighters embarking from California ports; with a tremendous increased demand for all sorts of food supplies; the focal shipping points of the State could easily have become a bottleneck in the Pacific campaign. That it did not - is due to American ingenuity, resourcefulness, organizing ability and the willingness of the producer to go the limit in meeting the demands of war. California also knew the Japs, better than any other state in the Union - and loved them not.

With California's tremendous agricultural production possibilities, it seems an anomalous situation that in normal times she imports a good deal of her livestock feeds, grains and concentrates. A great deal of such products are also moved from one part of the State to the other. Baled alfalfa hay and cottonseed are shipped from the Imperial and San Joaquin Valleys to the dry lot dairy farmers of the Southern Cost Region. Grain feeds from the Sacramento Valley are shipped to the Petaluma poultry farms, etc.

The dry lot dairymen of populous southern California merely manufacture milk from imported feeds. Cows on such farms were actually stall fed. As war transportation needs and man-power shortages increased many of these milk factories were forced to quit, thereby lessening the local output of vitally needed dairy products and meat supplies. Poultry farming and other lines of specialized farming for which California is noted also suffered.

Citrus groves needed thousands of tons of commercial fertilizer annually to keep their orchards productive. Feed and fertilizer represented heavy freightage to add to the congested railway systems. In passing it might be said that the railways including the dominant Southern Pacific, did a marvelous job in wartime transportation.

In the matter of commercial fertilizers, California needs some 275,000 tons - nitrogen, phosphoric acid, potash and various compounds of these ingredients annually - about half of which is used by the citrus industry. In 1941 approximately 265,000 tons

of this highly concentrated fertilizer was used; in 1942, to meet increased production demands, 302,445 tons were spread on California lands, 18,500 tons of which went to the deciduous fruit farms, 97,000 tons to citrus groves and the balance to vegetable lands. The need and use in 1943 was approximately 385,000 tons. A very small percentage was furnished by the Government each year.

The livestock and feed problem was a tough nut to crack. Somewhat different from World War I was the fact that nationally we had a big surplus of cereals, the crying need being meat, dairy and related high protein products. The per capita consumption of meat, for instance, is 141 pounds in normal times. The soldier eats 364 pounds in wartime.

More meat and kindred products was an outstanding wartime need, but meat must be produced from local cereal and herbage crops as much as possible to cut down on road and rail transportation where fighting men, their equipment and sustenance supplies must have the right-of-way. California farmers, therefore, were called upon to make radical shifts in their crops and in their methods of handling them.

In August 1943, fifteen leading agricultural experts summarized: "Maximum wartime production in California probably means producing more of the food used locally and less of the specialty crops exported from the State." California fruits, particularly the citrus varieties, were also badly needed throughout the world and no curtailment was desirable. To reduce the need of imported feeds, we find these experts agreeing on practices which had already proved their theories. These included increased use of irrigated, improved pastures; timing of crop harvests; timing of breeding programs; pasturing by hogging down of concentrated forage crops such as corn, peas, soybeans, and alfalfa; pasturing of rank-growing grain later to be harvested and better control of parasites and diseases.

One instance of hogging down diversified crops was on the University of California Farm itself where hogs, harvesting their own feed in the field produced 447 pounds of pork per acre. Pork was worth at that time fifteen cents per pound on the hoof.

Shifts were made from fiber crops - mainly cotton - to food crops. Some 300,000 acres additional land was brought into production in 1942 and 1943. Considerable reduction was made in acreages of such crops as lettuce, cantaloupes and watermelons, this also reducing the load on the railroads and truck transportation systems. Around 30,000 acres of melons in the San Joaquin Valley alone were switched over to beans, potatoes, alfalfa and other valuable food

crops in 1943. Intercropping of orchards added some 35,000 acres to the area of food-producing crops.

Stock feeds needed and used, which included tame and wild hay, grains and commercial by-products, in 1942 totalled 7,375,000 tons, and 7,729,000 tons in 1943. The estimated needs in 1944 was 7,849,000 tons and estimated maximum production possible was placed by the experts at 7,739,000 tons. Shifts in crops cannot be made overnight, though, and the maximum stock feed production, even yet short 110,000 tons, could not be reached until 1945.

The considerable group of agricultural experts figuring out California's agricultural land use problems, wartime and post-war, in August 1943 got down to individual cases and worked out the following detailed figures on feeds needed by different classes of livestock to keep each animal producing normally.

Amount of Feed Needed for Animal, per year, besides
Average Pasturage

	Grain (Lbs)	Commercial (Concentrates) By-Products	Tame & Wild Hay (Lbs)
<hr/>			
<u>Class of Stock</u>			
Horses & Mules (inc. colts)	400	- - -	4,900
Milch Cows	925	300	7,800
Beef Cows	40	100	2,200
Feeder Cattle	700	610	1,300
Other Cattle & Calves	75	50	1,150
Ewes - 1-year old	8	8	160
Feeder Sheep & Lambs	50	40	120
Other Sheep & Lambs	4	4	150
Hogs - per cwt. of production	400	25	---
Hens and Pulllets	66	18	---
Chickens Raised	10	4.5	---
Turkeys Raised	80	18	---

The same study showed that out of a total of eleven and one-half million acres of actual and potential cropland in California, 6.4 million acres were used for crops in 1942. Roughly divided, 30 percent of the land was occupied by intertilled crops such as vegetables, corn, and sugar beets; 52 percent grew grain crops and 22 percent produced sod crops such as alfalfa and similar forage products. The excess four percent is on account of the double-cropping practiced on the more intensively-farmed lands.

A more detailed tabulation of California farmland uses as prepared by this same committee of experts follows. However, it must be borne in mind that the larger part of the State's most fertile lands are almost worthless without adequate irrigation water. The figures are exclusive of lands to be brought under irrigation by projects under way or planned, and include only lands immediately adaptable to dry farming or irrigable with water at present available.

MAJOR FARMLAND USES AND POSSIBILITIES

		Maximum Area to Produce Most Food Without Economic Disruption
<u>Type of Land Use</u>	<u>Land Use in 1942</u>	
Irrigated Land:		
Intertilled Crops	* 1,477,000 Acres	* 1,394,000 Acres
Grain Crops	973,000 "	1,045,000 "
Sod Crops	1,188,000 "	1,355,000 "
Orchards & Vineyards	** 1,225,000 "	** 1,225,000 "
Other Plowable Pasture	90,000 "	24,000 "
Summer Fallow & Idle.....	265,000 "	187,000 "
<hr/>		
Total Irrigated	5,218,000 "	5,230,000 "
Non-Irrigated Land:		
Intertilled Crops	224,000 Acres	274,000 Acres
Grain Crops	2,322,000 "	2,375,000 "
Sod Crops	194,000 "	254,000 "
Orchards & Vineyards	356,000 "	356,000 "
Other Plowable Pasture	1,951,000 "	1,881,000 "
Summer Fallow & Idle	1,235,000 "	1,142,000 "
<hr/>		
Total Un-Irrigated	6,282,000 Acres	6,282,000 Acres
Irrigated and Non-Irrigated:		
Intertilled Crops	1,701,000 Acres	* 1,668,000 Acres
Grain Crops	3,295,000 "	3,420,000 "
Sod Crops	1,382,000 "	1,609,000 "
Orchards & Vineyards	1,581,000 "	1,581,000 "
Other Plowable Pastures ...	2,041,000 "	1,905,000 "
Summer Fallow & Idle	1,500,000 "	1,329,000 "
<hr/>		
Total Irrigated & Non-Irrigated	11,500,000 Acres	11,512,000 Acres

(* Actually 200,000 acres more available on account of double-cropping.)

(* Approximately 35,000 acres additional area available by intercropping.)

The above figures dealing with California farmlands immediately available for use would in no way disrupt the State's valuable

and highly specialized fruit industry but would, at the same time, provide for greater local production of the type of foods needed in the war effort. Transportation and stock feed problems and, to a certain degree the fertilizer problem, would be fairly well taken care of locally by this plan. It will be noted that orchard and vineyard acreage remained the same, with the acreage of intertilled crops reduced one percent.

Eleven percent of the summer fallow and idle land was put to work and seven percent of the plowable pasture brought into crop production. The net result was a four percent increase in area of grain crops and sixteen percent in sod crops. It was current knowledge that many tens of thousands of acres of idle farm land could be brought under irrigation in the Sacramento Valley within a comparatively short time if finances, farm machinery, equipment, pipe and above all, labor, could be made available amid the multitude of wartime demands.

What is the luxury of one generation is the necessity of the next and sometimes, indeed, is found on the scrap heaps of the third. World War Number Two brought out more forcibly than ever how mechanized our California agriculture had become and the many intricate machines used. Could a covered-wagon pioneer of the fifties suddenly return from the grave, he would be utterly unable to call by name the various land-using implements now in common vogue, nor perhaps to even divine their purpose.

With war needs for ships, planes, tanks and guns utilizing the same materials of which agricultural implements are made, and in a way for national existence taking first priority, replacing farm machinery, and parts for old equipment became one of the farmer's chief headaches.

Increasing scarcity of labor, coupled with war demands for greater production, made this machinery shortage more acute, as land users patched up their old equipment, invented homemade contrivances and working longer hours, fell back as much as possible on the motive power of their forefathers, the horse. Here, too, was something of a problem, since through the preceding years of mechanical farming, horses had become a comparatively scarce article in rural California and then, too, horses must be stocked with farm or range crops whether working or idle, in contrast to the machine which consumes fuel only when performing its functions on the land.

As industrial America caught up somewhat on the prodigious production of needed tanks, guns and similar implements of warfare, the situation became somewhat improved. In the matter of tractors

alone, there were 60,000 on California farms in 1942, some 62,000 in 1943 and approximately 64,200 available for 1944. The estimated needs for maximum wartime production was 68,000.

The various insect pests with which the California farmer is constantly plagued constituted one of his wartime troubles, although to the credit of Government agencies handling the allocation of materials it must be said that there has not been any acute shortage of insecticides. In 1942, control measures for insect pests and parasites cost Los Angeles county citrus growers alone \$1,680,000.

Annually in the pine-clad mountains of northern California, mainly in the Plumas National Forest, ladybugs are gathered and shipped to citrus producing centers. This little hard-shelled, handsome beetle is worth its weight in gold to California orchardists. An agricultural writer in late 1943 facetiously remarked that five million ladybugs were marching through California's citrus groves staging a counter attack against the crop's deadliest enemy, the citrophilus, as allies in the war effort.

Shortages of feed and fertilizer had a counterpart in the shortage of nursery stock. California fruits, particularly her citrus varieties, were badly needed in our own country, in the war-torn allied nations and more than elsewhere, perhaps, on the far-flung battlefronts of the world. In 1943, California lemons, where available, were grabbed off on the streets of London at one dollar each. By the late summer of 1942 there were only one and one-half million fruit trees of different varieties on hand at California nurseries, while the annual normal needs for new plantings and replacements were two and a half million. It can, therefore, be readily seen that any plans against wartime expansion of fruit areas was a sound policy.

During wartime, there was no lack of markets for anything a farmer might raise, from hogs to oranges. The OPA carried on a valiant struggle to maintain price levels but farm price ceilings on many products were impossible due to weather conditions, uncertainty of production volume, variance of prices in different communities and other factors.

All in all, the farmer received fair prices for his produce, which was raised from time to time as wages and production costs advanced. All through 1942, however, on-the-farm prices were out of line with industrial income. A check made of a dozen items by the Pacific Rural Press, leading California farm paper, in September 1942 showed farm produce prices even lower on most of them than in World War I, as the following summary shows:

(From files of the Pacific Rural Press)

Commodity	Unit	Prices	Prices
		Sept. 1918	Sept. 1942
Butter	lb.	51¢	45¢
Eggs	doz.	59¢	44¢
Hogs	lb.	17-3/4¢	15.4¢
Cattle	lb.	11½¢	13¢
Lambs	lb.	12½¢	13½¢
Oranges	box	\$7.50 to \$8.00	\$4.00 to \$4.25
Lemons	box	\$5.50 to \$6.50	\$4.75
String Beans	lb.	7¢ to 9¢	6¢ to 8¢
Lima Beans (dry)	lb.	12¢	6¢
Pink Beans (dry)	lb.	7¢	5¢
Colored Roasting Hens	lb.	38¢ to 40¢	33¢ to 34¢
Wheat	Bu.	\$2.20	\$2.05

A year later, however, there was a considerable upward trend in on-the-farm prices, since it was not in the cards that farmers maintain the same price levels with a jump of as high as 300 per cent in harvest labor wages and a higher cost of working equipment. Referring to three items in the comparison just above, by April 1943 butter was 56 cents a pound, eggs 49 cents a dozen, and pink beans 12½ cents a pound.

Wage increases negotiated by organized labor officials to teamsters and other workers handling food products from the farm to the basket of the ultimate consumer were largely responsible for the wide range between on-farm and retail prices. In the summer of 1942, tomatoes were selling in grocery stores for as high as 15 cents a pound; farmers received 6½ cents a pound. Lettuce retailed at 10 to 15 cents a head; the grower received 3 to 4 cents a head. A farmer sold his onions in the field for one cent a pound; the storekeeper charged the housewife 4 to 4½ cents a pound. While, as stated, farm produce prices were much higher by the middle of 1943, the wide range between on-farm and retail prices was almost as widely marked.

In the late summer of 1943, the Division of Markets, State Department of Agriculture, made a State-wide survey of farm and retail prices. This check was confined largely to independent stores; only a few chain stores included. While retail prices were in some cases lower in the chain stores than over the counter of the independent dealer. There was generally a still wider variance between the farm and retail prices of the latter. The State agency found that the wholesaler, controlled by law,

never added more than fifteen percent to the farm price and in some cases even less. The following tabulation shows the result of the State's study of the matter:

Producer and Consumer Prices Sept. 15 to 22, 1943

<u>Product</u>	<u>Unit</u>	<u>Producer Received (Cents)</u>	<u>Consumer Paid (Cents)</u>	<u>Price Increase (Percent)</u>
Apples	Pound	5.42	8.03	48
Beans	"	7.16	11.58	62
Cabbage	"	1.42	3.21	126
Cantaloupe	"	6.09	9.77	60
Carrots	Bunch	4.03	7.45	85
Cauliflower	Head	7.95	15.67	97
Celery	Bunch	8.55	16.91	98
Corn	Ear	2.52	5.27	109
Grapes	Pound	6.99	12.15	74
Grapefruit	Each	2.78	4.67	68
Lettuce	Head	4.96	8.35	68
Melon, Persian	Each	26.31	30.84	17
Onions	Pound	4.12	6.78	65
Oranges	Dozen	25.49	36.72	44
Peaches	Basket	39.58	53.37	32
Pears	Pound	6.24	11.10	78
Peppers	"	2.33	7.67	229
Spinach	Bunch	2.94	5.79	97
Squash	Pound	4.02	9.53	137
Watermelon	"	1.52	4.06	167
Sweet Potatoes	"	6.96	11.61	67
Potatoes	"	2.49	3.97	59
Tomatoes	"	4.85	9.28	91

When Governor Earl Warren assumed office as the State's chief executive on January 1, 1943, one of his first acts was to create a Food and Fiber Council. The members of this new wartime body were seven practical farmers. They granted far-reaching powers, and an appropriation of one and one-half million dollars for immediate use. The Council was to function for the duration of the war in directing California's wartime activities and developing post-war plans. The mandate to this council was to "Work with anybody and everybody going in the direction of 'Food for Victory.'"

The new, energetic governor was a friend of organized labor as well as a friend of the land, but the State's Legislators refused to follow Governor Warren's recommendations to appoint a representative

of Labor on the Council. The new official body, therefore, was composed exclusively of rural land users and quickly swung into action in tackling agricultural problems. One of their tenets was not to serve any agency or organization but to serve California - and in their own phraseology - "in any and every endeavor to direct agricultural efforts towards winning the war."

Farmers' organizations took kindly to the new agricultural war council, although looking somewhat askance at the different Federal agricultural agencies. The Farm Security Administration was particularly under fire. The farmers claimed that it duplicated the efforts and functions of the Triple A, while in turn, they claimed, both agencies somewhat duplicated the work of their close ally and bedfellow for two decades, the county farm advisor.

During 1943, the Farm Security Administration, as one of the agencies deemed by many as surplus in a wartime rural economy, was the subject of a bitter Congressional fight, the House of Representatives finally voted to discontinue it entirely but to carry on its twin brother, the Commodity Credit Corporation. Subsidiary payment to farmers was still considered an economic necessity by many legislators. The Senate, however, making a more detailed study of the matter in the spring of 1944, voted funds to continue the Farm Security Administration.

In 1942, California farmers received \$14,494,000 in all forms of Government subsidies, an approximate drop of twenty-five percent from the preceding year. To the credit of California farmers generally, it must be said that many of them felt that such Government payments were unnecessary, particularly in wartime. Subsidies were granted to growers of staple crops, so that few agriculturists producing California specialty crops such as almonds, dates and walnuts, shared in this Government largess.

In April 1943, we find Ray B. Wiser, president of the California Farm Bureau Federation, publicly declaring that his reasons for being opposed to farm subsidiary payments were that they were "unsound, unnecessary and inflationary;" that they "promoted inefficiency, built political patronage, were hard to get rid of, destroyed individual initiative and undermined character, pride and integrity;" that they "evaded budget balancing, created class consciousness, permitted those in authority to dodge disagreeable issues, and built strong, centralized governments."

Certainly the California farmer, as a free-speaking American, did not bow his head humbly before any Government agency, Federal or State. In general, nevertheless, he listened to the counsel of his farm advisor, invented short cuts in production, stood firmly

with his neighbor in the ranks of his cooperative, his local Farm Bureau, his Grange, and in a word, accepted the advice of either Government or private experts if such would result in adding to the stockpile of food and his own economic independence.

Crops and Farm Production

Although the American dollar, gauged in terms of agricultural parity values, has somewhat changed its complexion since Hitler's legions commenced their march of conquest, it is still the most reliable measuring stick to use as a basis of comparative crop production, thanks to its stable qualities in an inflationary world. Using this standard, therefore, we find that in 1942, for the first time in history, California passed one billion dollar mark in agricultural production, to climb to even much greater heights in 1943.

In spite of the fact that Japanese farmers were removed bodily off 194,000 acres of vegetable lands alone, from which lands they had wrested a profit of 32 million dollars a year, California discovered what some Californians had deemed impossible - namely, that the State could not only hold up to normal agricultural production without alien Japanese digging in the soil, but even exceed it.

California's total crop production in 1942 reached a figure of close to one and one-quarter billion dollars. In terms of even millions of dollars, this included livestock products, 375 million; fruit and nut crop, 326 millions; field crops, 369 million; and vegetable crops, 139 million dollars. In 1943, an all-time high figure of over one and one-half billion dollars was reached, with livestock products valued at 422 million; fruit and nut crops at 530 million; field crops at 352 million; and vegetable produce at 219 million dollars.

Besides dehydrated products, so much used to save shipping space, California's fruit and vegetable pack for 1942 was 43,080,641 cases; as against 40,516,246 cases in 1941. In the fall of 1943 the California Farm Bureau proudly announced that, in spite of labor shortage and other rural wartime conditions, not one pound of food was wasted due to the failure of California farmers to harvest it. Processing plants simply could not handle the tremendous volume of produce, however, and some food was wasted at the canneries.

The following is the 1943 record of California crop production, including only those products which individually grossed twenty million dollars or over at current farm prices:

Grapes (table, wine and raisin)	\$159,557,000
Dairy Products	145,237,000
Oranges	123,850,000
Cattle and Calves	104,149,000
Alfalfa	72,179,000
Eggs	69,568,000
Lettuce	51,143,000
Cotton	45,594,000
Peaches	43,615,000
Potatoes	41,985,000
Barley	40,009,000
Tomatoes	39,152,000
Lemons	36,005,000
Prunes	35,144,000
Sheep & Lambs (inc. Wool, \$10,005,000)	34,682,000
Beans	31,858,000
Walnuts	27,246,000
Hogs	27,103,000
Rice	24,272,000
Grain Hay	23,718,000
Pears	23,030,000
Cantaloupes	22,516,000
Chickens	21,026,000
Turkeys	20,000,000

While California was yet reaping her bountiful 1943 harvest the State agricultural experts, in compliance with requests from the central Government at Washington, were making plans for adjustment of 1944 crop acreages with the idea of producing foods most needed for the war effort. National food experts estimated that of California's 1944 food production fifteen percent would be needed for the armed forces, twelve percent for lend-lease shipment, two percent for special needs and about five percent to feed liberated peoples.

It can be seen that including war workers, members of the armed forces, and families coming to the Pacific Coast during the last few days or weeks of their fighters' sojourn on American soil, California was feeding within her own borders in 1943 some two million more people than in 1940. Figures on food volume needed were staggering. For instance, according to Army estimates, it takes an average of 2,485 pounds of food per year to subsist a soldier and 1,406 pounds to feed a civilian.

As indicated by the foregoing statistics and in compliance with war demands, California intended to hold her immense fruit, nut and vineyard acreage intact during wartime. Vineyards, occupying almost half a million acres, produced over one and one-half million

tons of grapes in 1943. The crush of grapes was the greatest in California history and at the end of the year there were 219,878,000 gallons of wine in storage. During 1943, 23,688,000 gallons moved into consumption channels. A lot of the cheaper grade wines were being turned into industrial alcohol for war uses.

Some idea of the value of California citrus fruits in the world struggle may be gained from the fact that of the approximate one and one-quarter billion pounds of food and other agricultural supplies shipped to allied fighting fronts in July of 1942, about twenty percent was citrus products, by far the larger part being concentrated orange, lemon, and grapefruit juices. The orange crop of 1943 was 43,643,000 boxes, a drop of over seven and a half million boxes from 1942 but still some eighteen percent over the ten-year average. In 1943, 14,940,000 boxes of lemons and 3,069,000 boxes of grapefruit were marketed. Altogether 307,000 acres were devoted exclusively to citrus crops in 1942 and 1943.

As shown in the preceding summary, among the deciduous fruits, peaches, prunes and pears each produced more than a twenty-million-dollar crop individually. The peach crop from 78,000 acres yielded a harvest of 596,000 tons; prunes grown on 137,000 acres produced 191,000 tons; and pears picked from 44,000 acres represented a harvest of 196,000 tons.

The olive production for 1943 from 25,000 acres was 59,000 tons, the average yield 2.38 tons per acre and the average price \$122.00 per ton. Since the war in Europe shut off olive oil imports, olives had become a prize California crop. Oils and fats, used so largely in manufacturing explosives, were a critical world-wide shortage and olive oil ranked high in this field. In common with almonds and lemons the California olive crop represented almost one hundred percent of the nation's total production.

In 1943 California fig production from somewhat less than 35,000 acres growing this species of fruit, showed a total of 43,000 tons with a farm value close to twenty million dollars. The 1943 walnut production was 57,000 tons and the almond crop 16,000 tons, the latter having a value of \$11,600,000.

The total production of all California fruits and nuts for 1943 was 6,623,000 tons, as against 6,402,000 tons in 1942. The 1943 average farm value of all fruits and nuts, lumped together, was \$80.03 per ton with an average over-all production of better than four tons to the acre. That on-farm prices had greatly improved is shown by the average price per ton for fruits and nuts the preceding year, given as \$51.69.

In spite of feed shortages and the fact that some dry lot dairy farmers were forced out of business from this cause, California farmers made a valiant attempt to reach the national goal set for them in livestock and dairy production. The number of milch cows did not increase but production did. In 1942, milk produced by California cows - 786,000 of them - was 51,800,000,000 pounds which reached a figure of 52,000,000,000 pounds in 1943. Beef cows increased in number some four percent. The hog population of the State expanded approximately 100,000 head in 1942 and 1943 over the 1941 figures. Sheep and lambs showed a net decrease in the two first war years. To meet the general feed shortage, tame and wild hay with a production of 5,107,000 tons in 1942, grown on 1,832,000 acres, the following year showed a production figure of 5,628,000 tons, harvested from 1,989,000 acres.

In spite of the loss of dry lot dairy farmers, Los Angeles, leading agricultural county of the nation, by adjustments in livestock production, showed an increase in this activity of \$15,059,000 (including all classes of livestock and poultry) between 1942 and 1943. The rabbit industry, with thousands of new backyard farmers, played no small part in Los Angeles county's 81-million dollar livestock returns of 1943.

Further north, San Mateo county, occupying a large part of the thickly-populated peninsula jutting northward into San Francisco Bay and with a large metropolitan population also at its back door, is usually considered in the public mind as being somewhat urban, rather than rural, in its economic life. Yet according to official figures, in the first year of the war its 829 highly specialized farms produced varied agricultural products to the value of \$9,209,773, an average return of over \$11,000 per farm.

In accordance with the plan of greater food production, cotton, still a leading California crop, shrunk in growing area from 355,000 acres in 1942 to 285,000 acres in 1942, and from a production of 402,000 bales in the first war year to 360,000 bales in the second. Flaxseed, produced with much less labor, somewhat usurped the place of cottonseed as a concentrated livestock feed. Cottonseed marketed in 1942 totalled 179,000 tons, to drop to 161,000 tons in 1943. In the former year, 3,535,000 bushels of flaxseed were grown on 202,000 acres; in the latter year, 4,688,000 bushels were produced on 293,000 acres. The production of flaxseed per acre averaged 16 bushels for which the farmer received \$3.24 per bushel.

Wheat, that old monarch of California field crops, steadily lost ground, to be supplanted by other cereals. Wheat in 1943 occupied 456,000 acres; barley, 1,299,000; oats, 169,000; grain

11,000; and corn, 74,000 acres. The approximate production that year of these leading cereals was 8,436,000 bushels of wheat; 36,372,000 of barley; 5,408,000 of oats; 4,070,000 of grain sorghums; and 2,516,000 bushels of corn.

There was a considerable reduction in acreage and production in 1943 over 1942 of these important cereals, a fact which somewhat worried food production administrators. In the spring of 1944, however, there was a trend to increased corn planting since this crop could be harvested by livestock themselves. That important world-wide food staple, rice, occupied 230,000 acres of California farm lands in 1943 with a yield of over fourteen million bushels; in 1942, 207,000 acres planted to this crop had produced a harvest of 12,627,000 bushels.

Lettuce continued to hold the lead in California vegetable crops although the acreage dropped from 93,990 in 1942 to 78,700 in 1943. In the last named year, the total State production was estimated at 15,083,000 crates and this represented over nine billion heads of lettuce. California has three distinct crops of this popular salad vegetable - spring, summer and fall.

California tomatoes ran a somewhat distant second to lettuce in production value. The area of this crop decreased from 154,830 acres in 1942 to 141,000 acres in 1943. The average production per acre, however, was 640 pounds greater during the second war year. The State's tomato crop, expressed in terms of 32-pound lugs, in 1942 was 8,803,000 lugs but the following year was estimated at 8,943,000 lugs on the reduced acreage. This love apple of the ancients was a valuable food item in the diet of the American fighting men.

While the area in the tasty melons for which California is so well noted was drastically reduced to a total of 33,500 acres, California farms in 1943 produced 5,553,000 crates of cantaloupes and similar sweet melons, and over 65,000 tons of water-melons. Asparagus was in popular demand by both civilians and the armed forces and the acreage in this crop dropped but slightly to a total of somewhat over 70,000 acres in 1943, with a gross production of 78,000 tons.

California's wartime crop of peas covered 93,990 acres in 1942 and 78,700 acres in 1943. The production of this popular legume, dropped from 96 million pounds in 1942 to approximately 75 million pounds in 1943. This item was particularly short at that time on the grocer's shelves during the war years.

Driving through varied large sections of California the traveler could easily be led to believe that the State produced enough dry beans to feed the world. The demand for this high-protein product was almost insatiable - pinks, whites, limas and other

and other varieties. Easily transported; planted, tended and harvested with comparatively low costs, and bringing in a fair financial return per acre, it is not surprising that California farmers practically reached the goal of 452,000 acres set for this crop in 1943, an increase of 54,000 acres over 1942.

The total dry bean production - all varieties - was 489,000,000 pounds in 1942 to rise to approximately 516,900,000 pounds in 1943. This was ten percent above the annual production of the previous decade and approximately one-third of the entire dry bean crop of the nation. Incidentally, bean plants produce all the way from the roots up. The straw, formerly burned in the fields, is now baled and finds a ready market as a mulch fertilizer. Beans can be planted on the same land as a succession crop without fear of soil deterioration since it gives more to the land than it takes away.

Irish potatoes are an ace wartime crop. Illustrating their value in the British Isles where food during war years was an acute problem, an English agricultural expert visiting California in the summer of 1943, stated that one acre of potatoes would feed a man three and one-half years; an acre of wheat two and one-half years; and an acre devoted to meat production only two months.

California farmers, planting 69,000 acres of potatoes in 1942, increased the area in this important food crop to 88,000 acres in 1943, in spite of the fact that Jap potato growers were all in internment camps. The yield in 1942 was 23,130,000 bushels; in 1943 the harvest was estimated at 27,930,000 bushels. However, the average yield per acre dropped from 335 bushels in 1942 to 317 in 1943, although still very much more than double the national average production.

The record California potato crop in 1943, peculiarly enough, was grown in the hot Perris Valley, in Riverside county. On a 16-acre field, N. E. Walker & Sons produced 6,784 one-hundred-pound sacks, an average of 424 sacks per acre. These potatoes were graded U. S. No. 1 by Government experts. Except for those produced on the old bed of Tule Lake in Modoc and Siskiyou counties, California potatoes have not the keeping qualities of those grown in colder sections of the United States.

Boiled, baked, fried - cooked in a score of different ways - the lowly spud forms one of the chief articles of diet of the Aryan world. As a cereal substitute and even as a source of fuel, the American-born potato, not yet three and a half centuries old, will go down in history as the greatest vegetable food contributor to the greatest war of all time.

Poultry and egg production in 1943 reached the highest peaks known. California hens in 1942 laid 1,909,000,000 eggs the production increasing still further in 1943 to 1,925,000,000. Eggs processed into powder to save shipping space, formed a staple in the protein diet of millions of our fighting men even though it probably killed forever their appetite for scrambled eggs. And while wartime eggs were so plentiful in California, one egg per person a month was the restricted ration in the city of London.

Laying hens, and pullets not yet sufficiently mature to perform their wartime production duty, numbered 14,934,000 on California farms in 1942. The check on hens and pullets in 1943 accounted for 15,695,000 birds. On the urging of food administrators poultrymen were cutting down on their normal production of fancy broilers and turning their attention to increasing the output of eggs and heavier meat. To help the nation insure that every American fighting man would have his full share of Thanksgiving and Christmas turkey, California poultry farmers raised 3,139,000 birds in 1942 and 3,750,000 in 1943.

With no set ceiling on the product, the acute sugar shortage in 1942 sent the price of honey soaring. The apiarists of California produced around 22 million pounds that year. Riverside county, responsible for about 90 percent of the State's date crop, helped to alleviate the sweetening shortage by producing some ten million pounds of this sugary fruit.

Sugar beets, a heavy labor-using crop, shrunk in area from 169,000 acres in 1942 to 70,000 acres in 1943 and in production volume from 2,325,000 tons in the former year to 1,078,000 tons in the latter. Average production per acre, however, increased more than one and one-half tons. The farm value of the 1943 sugar beet crop was around ten million dollars. The reduction in acreage of this important California field crop was keenly felt in local livestock circles since the field residue is a valuable self-harvesting stock feed.

To keep up with the increased food production demanded at home and abroad, the production of vegetable seed was greatly accelerated during the war years. Russia alone in 1943 received from the United States sufficient tobacco seed to plant 200,000 acres. The national output of vegetable seed in 1939 was 123,000,000 pounds; the estimated production in 1943 was 355,000,000 pounds. Flower seed production, although curtailed, was by no means neglected in wartime, and California produced a large part of the national output of both vegetable and flower seeds.

Naturally, the area devoted to seed production increased in 1943 over 1942 about seven percent. In California during the two years the area expanded from 150,000 acres to approximately 170,000 acres, Mustard, one of the weed enemies of the farmers of the Great Plains, presented waving fields of yellow blossoms in the South and Central Coast Regions of California where the seed is raised as a commercial crop.

Santa Barbara county, where the seed industry is centered in the Lompoc Valley, produces more flower and vegetable seed than all the other counties of the nation and during wartime was credited with a greater output than all the rest of the world put together. Cabbage and cauliflower are two of the varieties of seed for which there is a world-wide Allied demand. Cauliflower is the highest-priced seed in the catalogue of common vegetables, retailing in 1943 at \$35.00 a pound.

Practically the entire output of scarlet runner bean seed harvested in Lompoc Valley that same year was sent to England where it is highly prized for both ornamental and food purposes, although of little demand in our own country. So far as price is concerned, the double petunia seed is the plutocrat of the California seed industry, commanding a price of \$4,000 a pound. However, a pound of the product contains well over four million seeds of dust-like fineness.

A highly specialized and commercialized form of land use, the seed farms of Lompoc Valley, besides their great contribution to the war effort, brought a restful vision of floral beauty to many thousands of soldiers in nearby army camps.

With the current slogan of "Food for Victory" a common phrase on millions of tongues, California Victory Gardens added a tremendous volume of food to California's vegetable output. Any accurate estimate of the number of these miniature farms, the area covered or the total volume of production is impossible since they were planted and tended in every urban residential district of the larger towns and cities, along railroad rights-of-way, on vacant lots in the heart of metropolitan areas, in public parks, on fruit farms where they never grew before, and alongside cabins in the mountains. Backyard farming was taken seriously in California's kindly climate and besides the aggregate total volume of production, had the effect of pulling staid citizens from the golf courses and keeping restless ones off the highways.

Quite true, victory gardening meant for some amateur city agriculturists merely special dressing for the part in new and novel types of raiment and the purchase of fancy ground-working

tools, but the wartime fad really blossomed into a worthwhile aid to the war effort and interest increased rather than waned as the war progressed. It was somewhat enlightening, too, what a few square feet of growing vegetables, a hutch of rabbits or a pen of chickens did for the urban dweller. The actual physical contact with a fragment of the soil itself gave policemen, firemen, bank executives, lawyers, and other urban residents new perspectives of larger scale land use and a kinder attitude towards farmland problems.

In the summer of 1943, San Francisco reported 60,000 Victory Gardens, San Diego county claimed 50,000 and the industrial sections of Contra Costa county boasted 25,000 vegetable gardens, besides 2,000 backyard poultry houses. Perhaps the Victory Garden movement was more urban than rural in its scope, never-the-less in 1943, thousands of California's specialized farms produced their own family garden stuff for the first time and all in all, this worthwhile activity resulted in relieving the State's transportation systems from moving many millions of pounds of food supplies from producer to consumer.

There was ample need for all the supplementary vegetable volume Victory gardeners could produce. In the late 1943, food administrators at Washington, carefully weighing the food needs of our Allies, our armed forces and our civilian population, in expressing the need for fruit and vegetable production, simply called on California to "produce all you can."

In the light of two years of warfare, these food experts set as 1944 California agricultural production goals a 100 percent increase in peanuts as a source of valuable oils and proteins; an 82 percent increase in sugar beets; a 14 percent increase in sweet potatoes; a 33 percent increase in wheat to bring the acreage in this cereal up to 700,000 acres, and an 11 percent increase in the production of dry beans. They requested that the production of milk, eggs, cattle and rice remain the same. Reductions were called for of 7 percent in turkey production, 30 percent in broilers; 8 percent in cotton and 9 percent in flaxseed.

California's production volume of the same crops varies greatly in different sections of the State, so to assist in working out food quotas, in the fall of 1943, the Bureau of Agricultural Economics with other agricultural agencies got down to figures showing the former actual and the potential wartime production per acre of various food staples on California lands, not in localities especially favorable to the particular crop concerned, but average acreage production of the State as a whole. From a wide, detailed survey and the mass of statistics available, the agricultural experts condensed the following production data:

Estimated Per Acre Pre-War and Wartime Yields of
Selected Crops in California

Crop	Production Unit	Production - 1937 - 1941		Estimated Pro- duction - 1944	
		Irrigated: Lands:	Non- Irrigated Lands	Irrigated: Lands	Non- Irrigated lands
Corn	Bushel	37	20	37.5	20.3
Grain Sorghums	"	38	21	38.4	21.1
Irish Potatoes	"	295	120	295	112.7
Sugar Beets	Ton	14	10	14.6	10
Sweet Potatoes	Bushel	122	69	117.5	69
Beans, dry edible	Pound	1,600	800	1,378	887.2
Oats	Bushel	39	26	44.9	26
Barley	"	34	23	33.4	22.7
Winter Wheat	"	26	14	27.2	14.3
Flaxseed	"	16.5	8	17.3	9
Alfalfa	Ton	4.4	2.1	4.4	2.1
Other Tame Hay	"	3.9	1.3	4.2	1.3
Peanuts	Pound	1,200	--	1,200	--
Tomatoes, processing	Ton	6.7	--	6.7	--
Cabbage	"	7.7	--	7.7	--
Onions	100 lbs.	268.3	--	268.3	--
Peas	30#-Bushel	83.2	--	83.2	--
Rice	Bushel	67.6	--	64	--

Into the midst of the nation's farmers, scratching their collective heads over the war problem of increased food production, Edward H. Faulkner dropped his bomb of "Plowman's Folly," a book which probably created greater interest in agricultural circles than any other ever published.

Faulkner himself was farm-raised, a college graduate, and for years served as a county farm agent. His book, printed and reprinted in 1943, coming in the midst of feverish wartime agricultural activity and while the memory of the costly Dust Bowl land tragedy was still fresh in American minds, called upon a nation to forget the time-honored slogan of "God Speed the Plow" and to throw the moldboard plow itself on the scrap heap.

Drawing his ideas somewhat from the floor of the forest, the rich soil and luxuriant growth of which is undisturbed by soil-stirring implements, this writer claimed that burying fertilizing humus deeply was a grave mistake and rather that such should be mixed in

the top few inches of soil by some such method as disking. In his rather startling revelations, Faulkner pointed out that in the rehabilitation of the Dust Bowl lands, experts did two things - planted trees, and chopped straw into the topsoil.

This advocate of new methods of land use took issue with even the Soil Conservation Service itself because they did not go far enough, although that soil-saving agency had for years recommended mixing of humus with the soil, and others of the new land apostol's theories. Faulkner claimed that vegetable matter, plowed under deeply in the American way of farming, formed a layer akin to blotting paper in keeping the moisture from reaching the plant roots and also that over-cultivation, rather than the lack of it, was the underlying cause of many of our agricultural ills. He pretty well proved his theories by personally producing heavy crops on very inferior Ohio land.

Farming, particularly irrigation farming, is quite^a different process here from that of the Eastern States. Messy fields, such as advocated by the author of Plowman's Folly, would tend to clog irrigation furrows and moreover, on double-cropped California lands there was little time to plant and grow a green humus crop for disking into the surface of the soil. Then, too, weed control is a leading factor in California agriculture. Some of the practices advocated had already been in effect in California orchards, although the green cover crops were usually plowed deeper than Faulkner's concepts of land use indicated as the best method.

While many California agricultural experts disagree with Faulkner entirely on the practice of shallow cultivation over a long period of time, undoubtedly some of the land cultivation methods which he advocates will in time become general in California in spite of the fact that they were mainly intended to apply to less-intensively used lands further east. California farmers, used to vast expanses of fields as clean as a hound's tooth, nevertheless, are already inclining to some of them, and are particularly considering the factor which gives promise of reduction in labor requirements through less disturbance of the soil itself.

Louis Bromfield, expert Eastern farmer, leading national author and winner of the famous Pulitzer prize for writing, subscribed one hundred percent to Faulkner's theories and in commenting on Plowman's Folly quoted a famous agricultural economist who said: "The civilization of this country is founded upon nine inches of topsoil. When that is gone, civilization will go with it."

Wartime Farm Labor

California history had no precedent for the wartime social and economic status of the farm laborer. Down through the decades of California land development had marched the Indian and the Mexican half breed, held on the big ranches under a virtual peonage system; the flood of Chinese followed closely; the Japs came on almost simultaneously with the turbaned Hindu and as the Japanese blossomed into a landed proprietor, the Filipino to a certain extent pushed both out of the picture as a hired farm worker. Through this mixed racial pattern tramped the American-born laborer, represented in more recent years by the Dust Bowl migrant rolling from one harvest field to the other in his battered flivver.

With the coming of military conscription which took the farmer's and farm laborer's son alike, gaps began to appear in the rural labor ranks. With the advent of actual war itself, increasing the demand for able-bodied fighting men, and the stepping-up of industrial war production, agricultural labor became scarcer. Rural workers drifted to the cities where any sort of labor found ready employment in the various wartime plants, at bloated wages. Many of them in time returned to the more peaceful existence of the country-side, as labor union agitators took advantage of this war-sent opportunity to force farm labor wages to new heights.

One cannot too strongly censure the rural laborers themselves. Suppressed as a class through the past decades, hammered from pillar to post, and existing under the most deplorable living conditions, it was quite natural that they jump at the opportunity to secure compensation more on a par with their city brethren. And to their credit, it must be said, that while at times labor disturbances rocked the gigantic war plants, in the rural labor ranks there were no actual strikes and little holdup in production effort.

In 1942, farm labor wages greatly varied throughout the State. During August of that year, in the central Sacramento Valley, men almond pickers were paid 60 cents per hour; women, 40 cents per hour. Men and women lemon pickers in Santa Barbara county both received 50 cents an hour. As somewhat of an anomaly, at the same time one large farm in Kern county, Mexican sugar beet harvesters, employed on a piecework basis of \$1.50 a ton, made an average of \$12.31 per day. True to the general custom of most of their kind, these highly paid workers quit every few days to have a grand splurge on the unusual surplus of money scorching their pockets.

A migrant family of fruit pickers, pausing in Butte county in the summer of 1942, all pitched in and on a piecework basis made \$40.00 in one day. They moved on the next, unworried over possible

gasoline shortage, announcing, "We want to see all of California we can while we have a chance."

Another migrant family of peach pickers all worked in the orchards, hiring a maid to take care of their tent and do the cooking. The scheme worked beautifully until the well paid maid-of-all work quit, claiming that the noise of fruit trucks loading nearby interfered with her afternoon siesta. Rural labor had become decidedly uppish and independent.

A banker in a heavy fruit-producing section reported one somewhat thrifty California-Mexican family as grossing one thousand dollars a month in wages, harvesting fruit on a piecework basis. Leon Gonzales, another Mexican farm laborer, was blessed with a wife and ten children, as well as a thrifty disposition. The elder children were able to contribute their quota during school vacation to the family piecework fruit harvesting. This family made a total of \$4200 during the rush season and besides paying off the mortgage on their home near Los Angeles, took back with them half a ton of dried fruit which they were allowed to pick up under the trees.

In the fall of 1942, milkers on dairy farms were under contract for \$170 per month, plus board and lodging. One large tomato grower quit operations that year in the red, having paid an average wage of \$8.60 per day to men, women and children engaged in harvesting his crop.

The farm labor situation was still more acute in 1943. Leading California statesmen that year pointed out that while industrial workers in the State had increased several hundred percent since 1940, regular skilled farm labor had shown a decrease of some fifty percent and this as against a reduction of only twenty-five percent in farm labor in the nation as a whole. They also cited the fact that agricultural labor ranked fifth in military draft deferment status, being superseded by labor engaged in production of planes, ships, ordnance and ammunition. With war-time demands for still greater food production and some of the food requirements capable of being filled only by California crops, the 1943 crop, they asserted, must be planted, tended and harvested - some way.

Professor R. L. Adams, leading agricultural expert of the University of California, warned authorities that almost twenty-four million man-days must be found to harvest the 1943 California crop, with a minimum of 45,700 full time laborers in March and a maximum of 147,815 in October, in addition to the labor of farmers and their own families. Fruit, nut and berry crops, the farm expert predicted, would consume 11,646,900 man-days; truck

crops, 6,758,700 man-days, and field crops, 6,089,400 man-days.

Professor Adams and his associates further pointed to the fact that labor costs constituted the chief item in California agricultural production, accounting for 77 percent of the cost of producing rice, 75 percent of the cost of producing cotton and 64 percent of the cost of growing cantaloupes and seedless raisins. Professor Adams' figures showed that during the war period the cost of producing raisins had jumped 73 percent; of cotton, 64 percent of cantaloupes, 64 percent and of prunes 63 percent. In spite of greatly increased prices, therefore, net profits to landowners were not as great as might be supposed from the higher wartime prices. The farmer's wartime prosperity stemmed mainly from the factor of unlimited markets for all he could produce.

Wartime studies of some of the vegetable foods passing through the State's canneries showed that to produce and pack ready for shipment required 454 man-hours for an acre of pole market peas; 442 man-hours for tomatoes (stacked in the field); 418 man-hours for pole market beans; 76 man-hours for spinach, 64 man-hours for squash; 58 man-hours for green lima beans, and 53 man-hours per acre for pumpkins.

In the matter of dehydrated foods it was estimated that to produce and dehydrate cabbage produced on one acre required an average of 132 man-hours; an acre of carrots called for 526 man-hours; one of Irish potatoes, 404 man-hours, while an acre of spinach could be produced and dehydrated with an average of 100 man-hours labor.

To grow and harvest its billion-and-a-half dollar crop of 1943, rural California rolled up its sleeves figuratively, and literally. The boss farmer blistered his hands along with his hired employees, the farmer's wife or daughter donned overalls and climbed on the seat of a tractor, white-haired farmers living in urban retirement returned to the soil and some few farm-raised people, heeding the call for greater food production, left their city jobs to come back to the land. The task was a huge one, but this was war - and California harvested her crops.

Several thousand Chinese, always good farm workers, to a certain extent replaced the interned Japanese. High school kids - and younger - were taken from urban centers to farms by truck to help in fruit and vegetable harvesting. Service clubs in urban centers turned out en masse to devote their Sundays to field or orchard labor when lack of harvesting man-power threatened. Not only were urban housewives driving taxis and street cars, making planes, guns and ammunition, but also worked by the thousands in the fields, orchards and processing plants. Instances would be too numerous

to list where Boy Scout troops, girl workers, or business men's organizations devoted part or all of their time for a period to California's agricultural efforts.

Soldiers home on furlough lent a hand and here and there towards the end of 1943 and in the spring of 1944, shell-shocked or crippled veterans whose wounds had earned them an honorable discharge from the armed forces, found that though they were unfit for further combat duty they could still join in the food production battle. Even Hollywood stars often donned overalls to bring their lily-white hands into contact with the soil, - not all of this press agent stuff, either. Urban and rural California were drawn still closer together by the bonds of a common problem of all-out food production efforts.

One of the big factors in the harvesting of California's wartime crops was the arrangements made by the United States Embassy in Mexico to allow 70,000 Mexican nationals to come to the United States as emergency farm workers. This scheme worked out well. In the spring and summer of 1942, some little difficulty developed with pea-pickers and sugar beet harvesters among this class through their not receiving the promised wage. Investigation disclosed that many of them were recruited from Mexican urban centers and entirely inexperienced in agricultural work. As they gained in experience and became more proficient, these troubles disappeared and, on the whole, this class proved efficient, conscientious workers. Some of these Mexican nationals, picking prunes in the Santa Clara Valley in the fall of 1943, earned wages exceeding \$11.00 per day.

Up to October, 1943, a total of 34,835 of these Mexican farm workers had come to California. Of this total, over 9,000 had been repatriated, leaving over 25,000 yet on the State's farmlands. It was estimated that 52,000 more would come to the United States in 1944, approximately 14,600 of whom would labor in rural California. The 1944 migration of this class of workers started in mid-February, when a trainload of 600 left Mexico City to work on California lands. There was somewhat of a drop in imported Mexican farm labor in 1944, somewhat compensated for by the use of German prisoners of war who, when they could be worked in large groups, were well paid for their labor on the land.

The old standby friend of the farmer, the county farm advisor, was an exceedingly busy man under California wartime pressure. The Agricultural Extension Service relieved the United States Employment Service, - a Federal employment clearing house which, under war demands, had grown out of the California State Division of Employment, - of much of the placement of farm labor. Extending their zone of operations to cover 130 centers throughout the State, the Agricultural Extension Service in 1943 placed in work

on farms for periods ranging from a few days to weeks or months, 33,000 volunteer women, 45,000 boys and girls, 4,100 youth in 29 special camps, and 1,530 adults in 7 camps. Including Mexican nationals this rural land servicing agency made a grand total of 313,964 labor placements that year.

The years of training of rural youth by county farm advisors and their work towards retention of youthful interest in agricultural matters, as represented by 4-H Clubs and Future Farmers of America, paid big dividends when farmers felt the pinch of wartime labor shortage. California boys - and girls - played a part in the rural war effort second only to their brothers - and sisters - in the regular armed forces. They did this without the regimentation processes imposed on Hitler's children or on the herded youth of the Mikado's empire.

Exports of the fifteen agricultural agencies in their detailed findings of 1943 produced the following figures covering California farm labor at the high season peak of employment:

	<u>Farmers and their families</u>	<u>Hired regular and seasonal laborers</u>	<u>Total</u>
In 1942	160,000	176,000	336,000
In 1943	162,000	183,000	345,000
Estimated in 1944	162,000	181,000	343,000

Wages for farm labor reached new heights in 1943, particularly for piecework harvesters. The average farm wage throughout the San Joaquin Valley was 65 cents an hour, but farmers usually thumbed their noses at the labor unions' eight-hour day maximum when crops were ripening towards spoilage, so that with lower rural living costs the per diem earnings of the hired workers somewhat paralleled that of the urban laborers.

The Research Department of the California State Chamber of Commerce gives as the average rate per day for farm labor without board on January 1, 1944 as \$6.90; on January 1, 1943 as \$5.70; on January 1, 1942 as \$3.70, and on January 1, 1940 as \$2.85. The 1944 wage rate represented an increase since 1940 of 142 percent. For the more permanent type of California farm labor the average monthly rate was \$120.00 besides board and shelter, as against an average of \$63.00 per month for the entire nation. California farm labor had reached a decidedly new position in the State's wage earner class.

Mines, Mining and Oil

Mines, Mining and Oil

During the great war, for the first time in California land use history, gold was a drug on the market. Gold would not make bullets, ships, planes, tanks or guns nor could it purchase from other nations sufficient of the raw materials needed for such engines of war. As heretofore stated, the gold mining areas lost in population during the war years and whole towns virtually went out of existence as the Government closed down California's famous gold mines, to divert their labor power into the production of the more prosaic but greater war value minerals. California's gold output dropped to a value of \$29,785,000 in 1942. In 1943 her gold mines produced only 48,000 ounces, valued at \$5,180,000, the lowest production point since 1848.

The increase in production of the more critically-needed war minerals was relatively greater than the drop in gold output. As indicative of this, in the field of non-ferrous metals, the number of wage earners jumped from 5,800 in 1939 to 13,600 in 1942 and on up to 18,600 in 1943. Wages paid workers producing copper, quicksilver, tungsten, manganese ore and other such strategic minerals climbed from somewhat over eight million dollars in 1939 to more than forty-six and three-quarter million dollars in 1943, an increase of 473 percent.

According to the State mineralogist Walter Bradley, California's mineral production in 1942, including petroleum and natural gas, was valued at \$408,738,434, or \$34,412,206 more than in 1941. This included sixty different mineral substances. Los Angeles county again led the State in mineral production with a total that year of 106 million dollars. Kern county mineral production was 75½ million; Orange, 27½ million; Fresno 24-3/4 million; San Bernardino, 24½ million; and Ventura county, 23 million dollars.

In 1943, California's over-all mineral production was \$449,536,000. Production of salines, including borates, potash, iodine, salt, soda and the soft minerals of like character, accounted for \$14,150,000. With construction of military establishments, housing of war-worker personnel and other war construction at a high peak, the output of cement in California reached a top figure in 1942 of 23,732,000 barrels, valued at \$36,964,000. The following year the production was 18,460,000 barrels, worth \$28,244,000.

Having proven their worth by actual test, concrete ships were being turned out of California shipyards, taking their places alongside vessels of wood and steel. These concrete freighters were huge, sea-going barges, perfect freight ships in every last

detail except that they lacked propulsion power. Towed behind another ship, their use added greatly to the freightage capacity of the long lifeline of material necessary to maintain our fighting forces overseas.

With epic battles marking the bitter struggle of the Axis power to acquire and hold the leading oil fields in the European and Asiatic theaters of war, the expansion of the California petroleum industry was quite natural. Oil was by far the leading war material and in addition to furnishing the motive power for food production on the home front, California oil was propelling ships, planes and tanks all over the globe.

California's 1943 petroleum output was 283,660,000 barrels, valued at \$290,752,000, twenty percent above the 1942 figure. The daily average production of crude oil in 1942 was 680,000 barrels; in 1943 the daily output averaged 778,000 barrels. During the first months of 1944 the average amount being pumped from California's wells had reached a total of 800,000 barrels a day. The production volume was still mounting, the average daily output for the week ending April 8, 1944 being 825,400 barrels; for the week following, 829,500 barrels.

Some idea, perhaps, of the magnitude of California's oil industry may be gleaned from the fact that in the late summer of 1943 suits were filed in the Federal courts under the informers' statute against the Union Pacific Railroad and six major oil companies involving \$1,476,000,000. These suits alleged imperfect titles to land from which it was asserted oil was illegally taken in amounts ranging in value from sixty million dollars by the Union Pacific Railroad to three hundred and forty-eight million dollars in the case of the Standard Oil Company of California. Altho these suits were dismissed by the Federal Courts somewhat over a year later, the case is illustrative of the fact that public oil reserves are in constant jeopardy from possible encroachment.

Nowhere in the world, probably, is the existence of the citizenry so much dependent upon gasoline as in California. Almost every use of land demands its daily quota of the motor fuel which war placed at the top of its demand list. In normal times, this versatile fuel floods rural California as the source of light, heat and motive power. The rural-urban way of living of hundreds of thousands of Californians makes motor transportation a necessity rather than a luxury.

In spite of the strict rationing which banished the long lines of pleasure-seeking motorists from the highways and the fact that no longer were pipe lines pouring oil into the tankers of the

Rising Sun Empire, gasoline for war uses was still exceedingly short and life for many Californians became a daily struggle for more motor fuel. Black markets, which flourished in the early part of the war, were in time pretty well brought under control by Government authorities as rationing agencies clamped down more and more on unscrupulous dealers and the sometimes fancied needs of motorists.

Many oil experts and custodians of public oil lands expressed concern over the possible depletion of national and California oil resources by the demands of war, plus the volume now grudgingly allotted for civilian use. The quality of gasoline furnished the general public fell far short of peace-time standards and was cut in quality again and again in order to stretch the supply. Amid the welter of use restrictions, the dire prophecy that actual famine was impending and the stark fact evident to everyone that even were there unlimited pools of oil underlying California Soil, there was still the labor and transportation shortage to be faced, the layman did not know just what to think of the whole oil situation.

Amid the dark clouds of pessimism and the regimentation of the State's oil resources we find Frank Buttram, chairman of the national oil committee of the Independent Petroleum Association of America, declaring early in 1944 that all the talk about a national oil reserve shortage was merely propaganda designed to help oil importers, and that there were still thousands of miles of untested, potential shorelands alone.

Later the same year another authority, Robert P. Russell, Director of Research for the Standard Oil Company of New Jersey, told a Congressional committee that there need be no worry over the possibility of petroleum gasoline becoming exhausted, since gasoline could be manufactured for about nine cents a gallon from natural gas bought for five cents per thousand cubic feet. He asserted that the nation as a whole had a known reserve of 85 trillion cubic feet of natural gas. At the same time, S. Burton Heath, NEA staff correspondent, stated that oil experts believed that the unknown natural gas reserve was as great as that definitely known.

In any case, active California oil wells were daily pumping the quota set by the responsible authorities, new holes were being pushed into the earth in the various fields, and the California Lands Commission was launching a move to drill many new test wells along Southern California's coast line.

California's oil situation was much better, on the whole, than most of the nation, if only by virtue of the fact that the oil reservoirs lay beneath her own soil. And as California lands had formerly produced a large proportion of the World's yellow gold to provide the wherewithal to wage other wars, they were now yielding some twenty percent of the national, and ten percent of the world's putput of the black gold of war and commerce.

Forest and Timber Use

The forests of America had gone to war in earnest. Wood -- and more Wood -- was an insistent demand of the war machine and as a priority need wood took its place alongside food and steel. In December, 1942, with the Titanic struggle a year old, it was estimated that the use of wood had already released two and one-half million tons of other critical war materials. The same month we find Undersecretary of War Robert P. Patterson telling the Pacific Coast lumbermen that the estimated 1943 national war needs in wood would total eighty-three billion board feet, twenty-five percent greater than the tonnage of steel to be used. Anyone with a flair for statistics could figure out that this tremendous volume of timber would be sufficient to construct a two-inch plank roadway, twelve feet wide, twice around the globe over land and sea, with sufficient left over to build a similar wooden bridge to each of the war zones.

The actual United States production of lumber for 1943, it transpired, was 39,792,000,000 board feet; this, however, in addition to the timber going into wood pulp and other uses so that the cabinet officer's statement was not far wrong. Seventy-seven percent of the nation's timber production was used directly or indirectly by the armed forces. The Army and Navy found thousands of uses for wood and wood products. The famous Mosquito Bomber was built almost entirely of wood and the perhaps equally famous PT ships were mostly of wood construction, as well as minesweepers and other naval war craft.

Wood containers were used for transporting thousands of varied articles of food and equipment overseas. Steel battleships still required wood flooring for their decks; wood was being made into resilient springs, door hinges and pipe; wood even entered into the construction of soldiers' shoes. Laminated wood substituted for steel in building construction, and war factories boasted of laminated wooden arched beams of as great a length as 120 feet.

The scientists of the Forest Service Products Laboratory at Madison, Wisconsin, patiently experimenting through the years,

came to the rescue with almost every wooden product demanded by war needs. The field of plywood alone was almost unlimited and the versatile plywood of war days was a far superior product to that of peace time use, withstanding every test of exposure to extremes of heat, cold and the elements generally.

Forest scientists had discovered and conquered the secrets of lignin, the cement which holds wood fibers together and wood could now be moulded, bent or twisted permanently into any shape or form. The field of wood plastics was almost boundless and processed wood could now be given the resilience and durability of steel. As a matter of fact, in early 1944, steel was actually being used at times as a substitute for wood when the latter was not readily available.

The forests of California and the nation generally were an almost unlimited source of the material of war, paper and paper products; rayon for parachutes and kindred uses; insulating materials; photographic film and even explosive bases, sugar and alcohol, were derived from our forest trees.

The Bureau of the Census reported California's lumber output for 1942 as 2,330,041,000 board feet. Ponderosa pine contributed 1,135,783,000 board feet of the total cut. redwood, 461,552,000 board feet; Douglas fir, 290,216,000 board feet; sugar pine, 262,787,000 board feet and white fir, 132,659,000 board feet. Incense cedar, Port Orford cedar, Sitka spruce and a small volume of hardwoods made up the balance of the 1942 lumber production. It might seem strange in passing that this 1942 cut was approximately ten million board feet less than 1941, in which year such heavy military cantonnement construction took place.

The national forests furnished 397,071,000 board feet of California's 1942 timber harvest, bringing close to \$300,000 into the counties in which they were located and over half a million dollars into the national treasury.

The Bureau of the Census figures for 1922 show that 311 sawmills in California and a small section of Nevada produced the approximate 1942 cut of two and one-third billion board feet. In addition, there were eleven establishments manufacturing only shingles and lath. Twelve of the California sawmills, each cutting more than fifty million board feet of lumber per year, were responsible for over forty percent of the entire year's cut of timber and fourteen other sizeable sawmill plants manufactured 466 million board feet. Fourteen still smaller sawmills cut almost 283 million board feet. Two hundred and seventy-one plants accounted for an annual cut of 519,919,000 board feet of lumber, the largest group

being that of 66 medium-sized mills which manufactured 150,869,000 board feet. Eighty-seven of the smallest sawmill plants altogether manufactured a total of only 6,685,000 board feet.

Just as in the case of farm labor, skilled woods workers were scarce and wages high. While 25,600 lumberjacks employed in the State in 1942 drew down \$48,600,000 in wages, 22,800 of these workers in 1943 were paid a compensation of \$55,500,000. Like the farmer, the lumberman also had a ready market for all he could produce, and at good prices. The average value of the lumber output of California sawmills in 1943 was \$36.40 per thousand board feet while the average price per thousand board feet over the entire United States was \$31.50, since the local lumber was naturally worth considerably more close to its heavy zone of use.

The wartime demand for lumber in California was responsible for the establishment of a large number of small sawmills of the portable and semi-portable type. Some of these were family affairs and a good many of them of the class characterized by foresters and lumbermen as "haywire." While located to a large extent along the western slope of the Sierra Nevada, in the Mother Lode section, close to points of use and further processing of their mill run output, these little sawmills sprung up all over the State and were even established in the San Bernardino Mountains where pine trees, jealously held for their esthetic value, had not been out for lumber in several decades. Lumber was usually sold at the mill site, as it came from the saw.

One such venture, a rather well managed affair, was located in private timber on the Foresthill Divide, some thirty miles from Auburn. The entire operating crew, ten hands in all, came from Arkansas, moving their plant and personnel overland in trucks which were later used in logging operations. This outfit was turning out Ponderosa pine boards three days after arrival on the ground. Cutting in privately-owned, second growth timber, logs rarely reached 30 inches in diameter, the utmost capacity of their saw in any case. Literally, all hands and the cook turned to logging, then back to sawing, by turns.

This entire plant was set in an opening on the forest floor, motive power for the saw and log carriage being furnished by an engine taken from a large truck. The old time-honored peavy, plus a considerable amount of back muscle, took the place of much of the machinery used in larger plants. The output of this small mill ran 10 to 12 thousand board feet per day and was grabbed up on the mill site at a price of \$32.00 per thousand.

Not far from the site of the Arkansas operation, the Government itself was operating a somewhat more elaborate plant, but harvesting mature timber instead of second growth. In this establishment, the Forest Service used for labor a fire-fighting crew of husky young conscientious objectors. Generally, the efforts of this particular plant, one of several such throughout the State, were directed to turning out bridge timbers and similar heavy lumber needed in connection with the war effort, besides manufacturing a considerable volume of shingles. A hurry-up call to fire duty merely meant the throwing of a shut-off switch and the crew piling into standby trucks held in readiness to roll to the scene of fire action. Not only did the crew at this particular camp operate a sawmill but also grow a large Victory Garden to help fill their subsistence needs.

Growing Wood

Foresters watched with tongue in cheek the cutting of second growth timber on California pine lands. Only the exigencies of war prices justified such operations. Conducted on lands which had been held in private ownership for two and three generations, the present owners were able to cash in by the harvesting of these thrifty, immature trees.

The main body of California's second growth pine occupies many thousands of acres of the higher foothills extending approximately from Fresno county on the south to Shasta county on the north. Stripped almost clean during Gold Rush days, the following decades saw it ravaged by fire, overgrazed by livestock, entire hillsides washed away by hydraulic mining, and otherwise devastated. Located for the most part on private land, little protection was given this future timber crop until well along in the 20th century.

Edwin F. Smith, supervisor in charge of the Eldorado National Forest, and who has lived for over half a century in that section, states that the preaching of those evangelists of conservation, the forest rangers - like himself, often native to the local soil - finally began to take root in the public mind and a greater measure of protection was demanded, and afforded.

One of the compilers of this history, who had not seen the pine groves of one section of the Mother Lode country for over thirty years, rubbed his eyes in amazement at sight of the stands of thrifty young pine, in places shouldering aside the chaparral growth to regain its native soil.

A previous study made of second growth pine in Eldorado county, the approximate center of the best growth areas, by three experts

of the Forest Service, had recommended that no cutting take place till 1992 when the stand of merchantable timber in the county would produce four billion board feet, worth twenty million dollars at the existing 1939 prices.

These foresters found that the average investment in the second growth pine lands was \$8.00 per acre. Making allowances for liberal annual outlay for taxes, fire protection, and compounded annual interest on the original investment, the net returns from the sale of timber would be four percent in 1992. While not an attractive profit for private speculation, the investment would be an ideal one from a public ownership standpoint. By applying the principles of multiple use as practiced by the Federal foresters, the experts' figures proved that profits on the long term investment could be considerably enhanced.

Foresters generally classify timberlands as "very poor," "poor," "fair," "good," "very good," and "excellent" sites in referring to timber production. In the California second growth pine belt the average height of a ponderosa pine tree on a fair site at 40 years of age is 34 feet; on a good site, 43 feet; on a very good site, 52 feet; and on an excellent site, 63 feet. At 70 years of age the average tree of the same species will have reached a height of 68 feet on a fair site; 83 feet on a good site; 102 feet on a very good site and 120 feet on an excellent site.

The wasteful practice of cutting immature timber is illustrated by the fact that in an even-aged stand of ponderosa pine timber on a site classified as "very good," the timber on an acre of 70-year old trees will represent 36 thousand board feet. On the same site at the end of 140 years the stand is 77 thousand board feet per acre, and with the timber of a much higher quality. "Excellent" sites produce an average annual growth of 1,000 to 1,500 board feet of timber per acre, per year, but it must be borne in mind that just as California fruit reaches its best quality at a certain age, so does the ponderosa pine of the California mountains reach its prime quality when ripe, or at the age of 150 years - and more.

A "fair" site of ponderosa pine in the California second growth timber belt will yield a harvest of 8 thousand board feet per acre at 70 years of age; 21 thousand board feet per acre of better timber at 100 years, and 34 thousand board feet per acre of still better timber when the trees have reached their approximate adulthood at 150 years. Even the average California site classed as "very poor" by the foresters, will produce 3 thousand board feet of timber in a 100 years and 12 thousand board feet per acre in 150 years. Since very few areas in the pine belt of the Sierra foothills were cut over till the 1850's, from the angle of a tree's

life cycle, California's second growth pine is still in its "adolescent" stage.

One private timberland owner in Nevada county, harvesting his second growth timber during the war period, had greatly accelerated its growth by thinning and pruning. Not caring for young growth, with a crew of four or five men this tree farm burned over the carpet of pine needles annually, leaving the forest floor clean. His theory of operation was that when the timber was sufficiently mature to cut at a profit, cut it off clean and plant a new forest, to be in turn annually burned over when the trees had reached a sufficient size to stand a slight scorching. His burning practices and the costly methods of caring for his hand-tended, artificial forest, covering some 800 acres, could not, of course, be applied to large scale operations. His artificial pruning of limbs up to 16 or 20 feet was decidedly commendable, resulting in a clean bole, the first log of which produced clear or tight knot lumber.

The assertion of Edward H. Faulkner in his "Plowman's Folly" that a man with a team and disk harrow could do more for farmland in a few hours than nature in decades, is repeated with reference to forest lands in a recent publication of the California State Division of Forestry. This booklet sets forth that "A few minutes with a pruning saw beats nature by a decade" meaning simply that hand pruning of trees in second pine growth pays later dividends.

Assuredly, the cash returns from timber obtained from trees with their lower boles cleaned of limbs during their fastest growing years, whether by natural or artificial pruning processes is well illustrated by normal lumber prices. In 1939, average retail prices in the city lumber yards of the State were \$110 per thousand board feet for clear lumber; for select grade (small, tight knots permitted), \$80 to \$105 per thousand board feet; for Number One and Two Common (tight knots only), \$40 to \$50 per thousand board feet; and for Number Three Common (loose knots allowed), \$25 to \$30 per thousand board feet.

Financial returns from the actual products obtained from forest lands, however, represent only a part of the value of such lands. Some of the most valuable forest lands in California never have, and probably never will, cut a stick of timber for lumber. However, as a storage supply for the life-giving irrigation water, without which modern California could not exist, their value ranks at least equally with those growing the finest timber in the nation.

Water and Irrigation

California's greatest land use problem, water, and more water, came definitely to the fore in war years. Wood could, and did, replace steel; versatile cement could replace both; crops could be shifted to meet wartime food need; even the rubber shortage could be relieved by manufacture of a substitute from native mineral oils, from cereals, or from rubber-producing shrubs. Underlying all and every need in California, however, was the water problem and as one of the regional officers of the Federal Forest Service pointed out, - "there is no such a thing as 'synthetic' water."

Water problems affected urban and rural life alike and some of the State's mushroomed towns and cities were in a tough spot with regard to increasing water demands. The city of San Diego was an outstanding example. In 1940 this seaport city had a population of 203,000. In 1943 the number of people had grown to 370,000, besides a constant complement of adjacent armed forces numbering 150,000 to 200,000.

As San Diego city officials watched their metropolitan population day by day spreading over the surrounding fields, they were reminded that their pre-war water development plans had been based on a maximum immediate population of 266,000. It must be admitted that San Diego, topographically barred from securing outside water, had planned wisely and well, had developed its own water supply without the benefit of Federal aid - but, based on peacetime development and not wartime demands. New works under construction, planned under normal conditions to be completed by 1960, would provide for an ultimate population of 320,000 people. A 20-year development plan, therefore, had to be telescoped into two years, with still insufficient water to provide a safe reserve supply.

Other California communities were faced with the same general water problem in the war years. The whole water problem of California was not so much a matter of basic supply as was proper conservation, storage and distribution.

In 1942 and 1943, the basic source of water, rainfall and snow over the State's terrain, was very much spotted. The official Climatological Data Report of the United States Weather Bureau for the year 1942 briefly summarized as follows:

"The annual precipitation for 1942 approximated the 46-year average. It was well above normal in the central and northern coastal basins and the Sacramento Drainage Basin, approximated the normal in the San Joaquin

Basin and was deficient elsewhere, especially in southern California where some stations had less than half their usual annual amount....The total annual snowfall was only 79 percent of the 46-year average."

In their similar annual report for the year 1943, the official weather observers stated in part as follows:

"The annual precipitation for the State for the year 1943 was somewhat less than the 47-year average. It was well above normal in the San Joaquin, South Coast and South-eastern Desert Basins, approximately the normal in the North-eastern Interior Drainage Basins and was far below normal elsewhere....Heavy rains in March and excessive runoff from the snow cover in the Southern Sierra Nevada during subsequent months caused the flooding of 112,000 acres of land adjacent to Lake Tulare by June 10th, causing estimated damage in the neighborhood of \$3,500,000."

California, used to climatic surprises in the way of water surpluses and shortages, nevertheless now believes that the ultimate was reached by the storm of late January, 1943. Of the total precipitation of 12.84 inches which fell in the vicinity of Santa Barbara that month, 10 $\frac{1}{2}$ inches of rain came during a storm of three or four days duration. In some of the southern California mountain areas during the same general storm, thirty inches of rainfall was not uncommon.

The heaviest precipitation recorded as a result of this January 1943 downpour was that falling in Santa Anita Canyon, northeast of Pasadena. The official rain gauge at this point measured 25.83 inches of water during a 24-hour period on January 22 and 23, the most intensive rainstorm ever recorded by the United States Weather Bureau. "Water-short" California now held the national record, both in rainfall and snow depth.

Mesopotamia, a barren, semi-desert land, was once the garden spot of the world. The muddy rivers of China bring floods, disaster and later famine by their intermittent flow. Both countries are notable world-wide examples of misuse of the watershed cover on the higher reaches of their streams. Areas of less historical significance all over the world and in our country also, where misuse of land has brought about economic disaster and depopulation, could be cited by the score. The pages of history, in fact, are replete with examples illustrating the dependence of food-producing lands on forested watersheds. One nationally known land use expert

states that if one type of land, such as the forests of a state or nation, is misused, all other forms of land use are thrown out of balance. Nowhere is this truer than in California where water is the greatest need, and is the chief resource of forested lands.

It was quite natural that the Crittenden Committee, headed by State Senator Bradford S. Crittenden, and appointed in 1942 to study and correlate the State-wide water plan, should turn for factual information to the United States Forest Service, public custodians of a large part of the State's watershed lands.

The 17 national forests of California produce an average annual runoff of water placed at 25,228,000 acre-feet, or 37 percent of the recently estimated total of 66,988,000 acre-feet runoff of the entire State. In the Southern California Coastal Basin, the national forest watersheds furnish 58 percent of the average annual runoff; in the Central Coast Basin and the great Central Valley Basin, 33 percent; in the Northern California Klamath Basin, 40 percent, and in the Great Basin east of the Sierra Nevada, 78 percent.

Even the earliest acts dealing with forest reserves and national forests involved the factor of watershed protection and water use, and almost all laws dealing with forests include the water conservation angle. Fifteen of these leading laws relating to forestry and water have watershed protection as one of their chief aims. The Forest Service in California, as guardians at its source of much of the State-owned and State-controlled water, work in close collaboration with other Federal and State agencies as follows:

State Division of Water Resources: - Reporting on Water Rights applications in cooperative snow surveys; examination of dams.

U. S. Army Engineers: - In upstream flood control under the Act of 1936 and later amendments.

Federal Power Commission: - In general administration of hydro-electric power projects.

Federal Fish & Wild Life Service and State Division of Fish and Game: - In protection of fish and game through control of water facilities.

State Department of Public Health: - In water pollution control.

U. S. Weather Bureau: - Providing meteorological data from many stations scattered throughout the national forests.

Bureau of Agricultural Economics: - Investigations under the Water Facilities Act.

Bureau of Reclamation: - Providing informational data.

U. S. Geological Survey: - In collection of valuable runoff data.

U. S. Soil Conservation Service and College of Agriculture, University of California: - In consideration and organization of Soil Conservation Districts.

National Resources Planning Board: - Various land use plans involving water.

The detailed report furnished by the Forest Service to the Crittenden Committee, therefore, embodied the best thinking of experts of all California public service agencies officially dealing with water conservation and use on a State-wide basis. As was stated in a preceding paragraph, the total average annual runoff of local California water is estimated at 66,938,000 acre-feet. The Federal foresters estimated, on the basis of present and fairly immediate future use, there would be required 13,238,000 acre-feet for irrigation; 42,645,200 acre-feet for hydro-electric power; 1,828,900 acre feet for municipal and domestic use and 120,000 acre-feet for mining operations.

These uses together, as listed, total 57,832,100 acre-feet, considerably less than the average annual runoff, based on official records maintained for several decades. However, you cannot use water down to the last gallon. A large reserve must be perpetually maintained and there is always the heavy loss by evaporation and seepage. Moreover, even under the most idealistic plan of water conservation and storage, a great deal of it must continue down the water courses to play its part in navigation facilities and logically, of course, on into the ocean. Topographic features create a surplus of water in one area while another area of the State is decidedly short, so that the grand total of the State's water harvest balanced against actual needs is not quite so imposing as it seems.

In its summarized report, however, the Forest Service, dedicated since its inception as a land administration agency to the principle of multiple use of land, brought out the angle of multiple use of water also. The same acre-foot of water, after turning the turbines which generate electric power, passes on its way to irrigate the farmer's land or flush the city sewers. In irrigation also more than half the water applied to the land finds its way back into streams or to underground channels.

The same acre-foot of water as part of the whole will furnish a home for mountain trout, a resting place for water fowl, boating for the recreationist, move the lumberman's logs along a flume, provide commercial water transportation and contribute its quota to the thirst of the wild deer or domestic cow.

The following tabulation, embracing figures taken from the 1943 consolidated Forest Service report, presents a picture of potentially available California water and irrigation needs only, - in itself, the greatest use of water in the State.

	Area	Acre-Feet	Estimated	
: Under Irrigation	: of Water	: Total	: Estimate	
: Immediately	: Needed for	: Average	: Estimate	
: Prospective	: Immediately	: Annual	: of 1950	
: Present	: 10-20 Yrs.	: Prospective	: Runoff	: Popula-
: (Acres): (Acres)	: Irrigation	: (Acre-Ft)	: tion	
Northern Cali- fornia north from San Fran- cisco and Klam- ath Basin	130,000 : 190,000	: 438,000	: 26,000,000	: 243,420
Sacramento Val- ley Basin and tributary areas:	: 1,249,000 : 4,266,000	: 4,032,000	: 23,305,800	: 662,086
San Francisco Bay Basin, in- cluding Santa Clara Valley	: 96,000 : 96,000	: 134,000	: 843,000	: 1,887,000
San Joaquin Val- ley Basin and tributary areas:	: 2,234,000 : 2,434,000	: 7,314,000	: 13,047,000	: 1,219,964
Southern Cali- fornia Coastal Basin, Mexico north to San Luis Obispo	: 676,400 : (2)	: 940,400	: 1,300,200	: 4,400,000
Great Basin east of Sierra Nevada (figures for California only)	: 170,000 : 60,000	: 320,000	: 2,392,000	: 77,000
Lower Colorado Basin served by California water	: 12,000 : 12,000	: 60,000	: 100,000	: 26,125
State Total	: 4,567,000 : 7,734,000	: 13,238,400	: 66,988,000	: 8,515,595
(1) Plus considerable acreage indeterminate at present.				
(2) Approximate conservative figures.				

It was believed that these figures, the joint product of the leading agencies dealing with California's complex water problems, were conservative and sound.

The Joint Senate and Assembly Committee headed by Senator Crittenden, characterized as strictly non-political in character, dug deeply into California's water resources problem. Besides the detailed, up-to-date data furnished by the agencies mentioned, they made an intensive study of the findings of eight Congressional and Legislative committees engaged in similar investigations between 1927 and 1931. In the preparation of their 1943 report to the State Legislature, they also studied sixty State and Federal engineering reports made on the subject between 1873 and 1934. Rather than any material amendment of the State Water Plan adopted by the Legislature in 1941 and which crystallized into the great Central Valley Project, the Crittenden Committee merely summarized State water needs, available resources, long range and post-war plans of development.

Central Valley Project Status

The Central Valley Project, previously described in these pages, is so interdependent, one unit upon another, that until completed almost in its entirety, one part of the State will be bettered at the expense of another section. In addition to the two larger lakes created by the Shasta and Friant Dams, 22 other major storage reservoirs formed part of the whole system besides the hundreds of miles of huge main canals and the complicated pumping systems.

By September, 1943, the project as a whole was less than half completed. The original estimated cost of 168 million dollars on the basis of which the voters of the State authorized finances for construction, jumped to 228 million in 1941, to 265 million in 1942, and to 333 million in 1943. As the work progressed various changes in design raised the costs and the original estimates were also based on pre-war prices of material and pre-war wage scales. In the fall of 1943, therefore, the financial report on the project showed construction costs to date as close to one hundred and thirty-nine and one quarter million dollars, leaving almost one hundred and ninety-four and one-half million dollars yet to be expended to complete the project. Some months later at the U. S. Senate hearing on the subject, Bureau of Reclamation officials testified that besides the balance left in funds already appropriated, 163 million dollars of new money was needed to finish the job.

In the fall of 1943 the great Shasta Dam was 80 percent completed and the Shasta Power Plant, 98 percent. The Friant Dam was 95 percent completed. Thirty-seven miles of the Contra Costa Canal and eight miles of the Madera Canal had been constructed. Work was

only well started on the Delta Cross Channel, the Delta-Mendota Canal and the Friant-Kern Canal. A lot of work was being held up on different units of the project due to inability of the Government contractors to secure materials and by the shortage of labor. The War Production Board eased up on restrictions during the last months of 1943 so that work could be pushed faster. By borrowing materials from Boulder Dam to rush the completion of Friant Dam, it was estimated that supplemental water furnished from this unit of the project would result in the production in 1944 of over one million tons of additional food, badly needed in the war effort.

By the end of the year 1943 the only irrigation benefits yet accruing from the great Central Valley Project was a limited use of water from one canal in Contra Costa county. Undoubtedly, the project would have been pretty well along towards completion in 1944 but for the intervention of the Great War and the resultant shortage of labor and materials. Ships, planes, tanks and guns came first. As it was, the Reclamation Service engineers could not promise any large scale use before 1946. According to the opinion of many of the State's water experts, it will probably be 1950 before the project is fully completed.

During the first months of 1944 the California Farm Bureau, backed by the State Engineer's Office, the Crittenden Joint Legislative Water Resources Committee and other public service agencies, took bitter issue with the policies of the Federal Reclamation Service of the Department of the Interior as applied to the Central Valley Project. Used to developing water on the basis of serving the small landowner, the Bureau of Reclamation rules were adamant on their regulation which limited water service to farm units containing a maximum of 160 acres. This meant simply that owners of more than 160 acres of land must either sell their excess holdings or forego the benefits of California's dominant water project.

There is little question but that this Reclamation Service ruling was intended originally to apply to Government lands homesteaded on Federal reclamation projects, but in California much of the water developed by the Government was to be used on old established farmlands some of which already had vested water rights under the State laws.

The Reclamation Service, furnishing rounded-off figures on the Central Valley Project, stated that the potential irrigable area of the project was eight million acres. Of this area within the scope of the project, 3,600,000 acres were already under irrigation and 4,100,000 acres were unirrigated lands. However, they further stated that 1,450,000 acres in each of the two classes of land, irrigated and unirrigated, represented holdings of more than 160

acres per farm. Thus nearly 38 percent of the lands to be irrigated were affected by the ruling. At about the same time, Secretary of the Interior Harold L. Ickes, in a public address before a San Francisco audience, stood pat on the matter of the 160-acre maximum farm ownership limit.

Up and down the State newspapers and public speakers accused the Department of the Interior of hidebound bureaucracy, infringement of State rights, and of throttling private enterprise, often including in their denunciation all Federal bureaus generally. Some of the antagonists of the ruling went so far as to bemoan the State's acceptance of the thirty percent Federal donation towards the cost of material and labor and the loan of other monies for the Central Valley Project at 4 percent interest, - although at the same time asking for further Federal aid on this and other projects.

To the unbiased, disinterested student of the matter, there is a good deal of merit to both the Federal and State side of the argument. The Constitution of the State of California distinctly favored and recommended small land holdings. Through the years State legislative committees had condemned large California land holdings as the curse of California land tenure. On the other hand, the Federal ruling was probably not intended to apply in such cases as in this California issue. The breaking up of long established farm units, particularly those of fairly limited acreage above the 160-acre unit, could not help but work a hardship on many small owners who by dint of enterprise and hard work had acquired land holdings involving forty, eighty or 160 acres above the old standby unit of a quarter section.

Many Californians, while willing to see virtue in both sides of the argument, expressed a fear that control of the State's resources would gradually pass into the hands of the national Government and that centralized administration would be the inevitable result of continued Federal aid in their development. It was the old question of State rights all over again.

The Act of Congress authorizing the Central Valley Project placed river regulation, - improvement of navigation and flood control - first; irrigation and domestic uses, second; and hydroelectric power development, third. The legislation provided that salinity control in the San Francisco Bay region and the proper conservation of fish life also take precedence over the generation of power, which was considered as incidental to other uses. Nevertheless, under wartime demands for power, the last, in a sense, became first, especially since the large public utilities were ready and waiting to divert the newly-generated power over their own distribution systems already in place.

In September, 1943, the Secretary of the Interior signed a three to five year contract with the Pacific Gas and Electric Company, - already producing and distributing eight and a half billion kilowatt hours of their own electric energy annually, - for the sale of 800 million kilowatt hours of the Shasta Dam power. This contract will yield three million dollars annually in revenue to the public purse of which \$2,700,000 is guaranteed by the contract.

When completed, the Shasta Dam and the nearby Keswick Dam will produce one and three-quarter billion kilowatt hours of electric energy annually of which about one-fourth will eventually be needed to operate the entire project, the balance being available for sale. Following the short wartime contract just mentioned, this same public utility has offered to take a long term lease on this surplus power, with a proviso to release the Government from its contract if public interest demand a different arrangement. The Shasta power plant went quietly into actual operation, July 14, 1944, without ceremony, through two 75,000 kilowatt generators.

The public revenues expected from this sale of power, which the Bureau of Reclamation engineers say will be fully available January 1, 1945, will average \$5,807,000 a year. Rural residents in a large part of California will be assured of a supply of electric power as plentiful and cheap as that enjoyed by metropolitan populations.

Upstream Flood Control

Army engineers had been well acquainted for decades with the dire threat of fires and floods in California, particularly in the southern section. In 1943, military authorities and custodians of watershed lands were very much worried over what large fires could do, not only to farmlands, but to military installations and war industries also in the way of slowing up of the war effort. Experts pointed out that a 5,000-acre brush fire in the upper reaches of the San Diego watershed, for instance, could raise a safe river stage into a damaging flood.

Even the most optimistic agree that with all the protective safeguards possible there will still be damaging forest and brushland fires and winter floods in California. Damage possibilities can be greatly reduced, however, by proper protective measures. It is not surprising, therefore, that with the pressure of public demand for better water conservation, the United States Forest Service under the authority of the Flood Control acts previously mentioned, continued in wartime to carry on surveys and work out plans for watershed protection and upstream flood control in vulnerable southern California. As somewhat illustrative of the values at

stake, Los Angeles county alone up to the middle of 1943 had spent 200 million dollars in flood control, with an expenditure of 50 million dollars more planned.

There was always some human agency to provide the spark which might touch off the tinder box represented by southern California's watershed cover. On November 9, 1943, for example, in spite of the fire prevention efforts of Federal, State and County foresters, there were seven large fires burning on rural lands in four counties of southern California, not to mention the scores of grass and brush fires being daily nipped in the bud by rural fire-fighting forces.

The Forest Service upstream flood control plans, coordinated with the Army Engineers and other agencies interested in water conservation and use, characterized upstream flood control as "a technique of prevention striking at the origin of floods." In their surveys and plans they established the following priorities: (1) Protection of forest cover from fires; (2) Prompt cover crop sowing of any burned areas; (3) Stabilization of mountain roads by better drainage practices and slope fixation; (4) Channel improvement.

Three important watersheds covered by survey plans might be mentioned. In the case of the present status of the San Diego River, the flood peak is 42,000 cubic feet per second and the resultant minimum flood damage \$960,000. A five-year program of upstream flood control, plus the necessary fire protection would cost \$404,000, reducing the peak flood to 33,000 cubic feet per second and the maximum possible flood damage to \$330,000.

The survey of the Santa Ynez River in Santa Barbara county produced factual data to show the flood peak at 110,000 cubic feet per second. Control and adequate fire protection facilities would reduce this flood peak to 90,000 cubic feet per second. The total costs of the control and protection program would amount to \$199,000; reduction in flood damages figures out to \$46,000 a year and other benefits such as increased farm income and reduction of silt in reservoirs, to \$372,800 per annum, or a total of \$419,200 annually. This represented a ratio of benefit to total cost of 2.10 to 1.00.

The Santa Maria River, still further north in Santa Barbara county, embraces a watershed of 1,198,720 acres roughly divided into 40 percent forest, 40 percent woodland pasture and open rangeland, 10 percent sand dune wastes, and 10 percent cultivated land, the last-named including very intensively used vegetable and seed growing areas. In the valley areas the river bed at present is silted

to bank level. The Federal foresters, working on a long range planning basis, placed the total maximum cost of flood control and protection for 50 years at \$4,723,200, predicated on approximately half private and half public expenditure. The net benefits were given a minimum value of \$5,962,000, representing a net gain in tangible values of \$1,238,000. Current patchwork water control in this area must be carried on in any case to stave off impending disastrous consequences.

The Army Engineers, altho chiefly concerned with navigable rivers and harbors, in their responsibility for flood control leaned more and more towards the factor of control of water at its source. A big stride in upstream flood control was the introduction in Congress of Bill H.R. No. 4485 which authorized the Chief of Army Engineers, under the supervision of the Secretary of War, to construct, maintain and operate recreation, conservation and other facilities advantageous to the interest of the United States, or to permit such construction, operation and maintenance. There was little question from the wording of the bill, generally received with favor by all classes, that the Army intended in the interests of national security to strengthen the protection efforts of the custodians of upstream public lands. This actually meant the multiple use of land - and water - so that the stockman, farmer, lumberman, manufacturer and recreationist could jointly share the benefits of the mountain areas, while at the same time the main Army purposes of navigation, open harbors and flood control would be better served by protection of the source of water.

Vital Waters

With the out-of-State waters of the Colorado River brought to its doors to supplement the Owens Valley supply, Los Angeles and the southern California Coastal Plain, although not sharing in the great Central Valley Project, had an ample water supply. Water rights in this section were jealously guarded and when Secretary of State Cordell Hull, under the Good Neighbor policy, in early 1944, signed a treaty with the Mexican Republic giving it 1,500,000 acre-feet of Boulder Dam water, a storm of protest arose.

A checkup with Reclamation Service engineers showed that in dry years the Boulder Dam outflow might go down to 8,500,000 acre-feet. Boulder Dam water commitments already included 5,362,000 acre-feet of water to California; 300,000 acre-feet to Nevada and 2,800,000 acre-feet to Arizona. The protestants believed that the cabinet officer's act might create a shortage of water in southern California in drouth years, notwithstanding the fact that there was ample water in normal times. California, and particularly the southern section, expected its population and incidentally, its water needs,

to continue the phenomenal expansion of recent years.

California's complex water problem is yet far from being completely solved. On one point all are agreed, - that clashing interests must be reconciled, if only because the economic survival of the commonwealth itself is at stake. The various carefully planned units of the Central Valley Project must all be completed speedily and regardless now of costs; water storage reserves must be based on maximum population growth; some happy medium on farm unit size must be agreed upon between Federal and State interests; watersheds given better protection, and the land user himself taught the value of intelligent water use.

Wild Lands in Wartime

The versatility of the forest ranger in rural land use practices was fully illustrated in California during the war years. In spite of the importance which the Government agencies handling military manpower attached to the positions of foresters and fire-wardens, and certain exemptions allowed such, the loss of men to the armed forces was heavy. No ban was placed on voluntary enlistments by either the Federal or State forestry organizations and many of the younger foresters entered the armed forces from personal choice. In spite of this drain of manpower, the United States Forest Service managed to stretch out and take over other wartime activities over and above their normal duties of protection and administration of the forests and watersheds.

Military maps, much more detailed than those already in existence were demanded by the Army and two huge military mapping projects in California's mountain areas were completed by the midsummer of 1943. To do the job, covering the most rugged terrain of the State, forest officers were called from other states to assist in the work. While much of the mapping was done by aerial photography, every form of ground transportation was used also. In the back country, topographers used pack mules freely to supplement the "shank's mare" work which was a common part of the job.

Perhaps their participation in this war mapping work had something to do with the inauguration of a project which California regional forest officers carried on during the early months of 1944. Selecting an area of over one million acres of the rugged Los Padres National Forest, these foresters thought ahead in terms of jeeps and helicopters for post-war fire control. This national forest embraces some of the most valuable as well as the most inaccessible watershed lands in the State, where ordinary truck trail construction means almost prohibitive costs.

Figuring on some 400 miles of relatively easily-constructed jeep trails and six helicopter stations on this million acres, investigation rather conclusively proved that as against a final ground plan of adequate forest fire protection costing close to seven and one-quarter million dollars, the aerial helicopter plan would cost less than one and three-quarter million. Some of the helicopter plan advantages were quick and accurate reconnaissance of fires from the air; possibility of elimination of fire camp cooking by the delivery of cooked food direct to fire-fighters; elimination of hiking fatigue; more frequent relief of tired fire-fighters and greater safety of fire-fighting crews, - the last-named an important factor in these rugged, fast-burning areas.

Another wartime job which the Federal forest rangers gladly took over was the construction of timber and mineral access roads. The war effort demanded much timber - right now- and wartime demands for strategic minerals was almost insatiable. Of 94 such road projects being handled by the Federal Forest Service in the United States by early 1943, seventeen were located in California, involving a total distance of 235 miles of mountain roads. Besides the timber tapped by these projects, such critically-needed war minerals as copper, tungsten and quicksilver were being made more easily available to points of use. Such roads, of course, also had a high value in forest fire control.

The months following the dark days of Pearl Harbor held a distinctly imminent threat of invasion for California, adopted home of thousands of foreign-born Japanese. In terms of flying time, the great bulk of California's wealth lay just over the horizon from possibly lurking enemy warships. Oil fields, food manufacturing plants, irrigation and hydro-electric installations were, relatively speaking, but a stone's throw away from potential enemy raiders. It is a tribute to the foresight of our military forces that pre-war plans made it comparatively easy to quickly man thousands of civilian aircraft warning service posts both in urban and rural areas.

Manning such posts presented a fairly minor problem close to populated centers where patriotic volunteers by the thousands donated their services, but the job in California's great hinterlands was quite a different affair. There was no patriotic volunteer population from which to draw and the posts necessary to form the back-stop of the airplane warning net were reachable only by long hours of hard, slow travel. Again the forest rangers of California proved their versatility and furnished almost untold, unwritten examples of courage and determination in carrying on this line of war work.

Years before, when war in the Pacific was a probability foreseen only by leading military experts who had no delusions as to California's vulnerability to air attack, the Army had begun to utilize the fire lookouts of both Federal and State forestry organizations as aircraft warning service stations. Manning of these stations and practice flights to test their efficiency had been carried on through 1939, 1940 and 1941, the services of regular Forest Service employees, State officers and employees of public utility companies whose duties took them into the hinterlands, being utilized in the maneuvers. After each test and study by the armed forces, cooperative efforts were bent towards speeding up communication facilities. As a result of these simulated air invasion tactics when actual war came, the time of spotting and reporting airplanes to defense centers had been reduced from several minutes to a matter of seconds only.

A grand final test was scheduled for December 12, 1941 from Oregon to Mexico, as well as in the other two Pacific Coast states. Last minute arrangements had been made to man thousands of aircraft warning service posts, including the particularly important high mountain stations forming the background of the net. This test never came, as the reality of actual war took its place.

Bombs had hardly finished dropping on Pearl Harbor that fateful day of December 7, 1941, when forest rangers were plowing through snowdrifts to man the outlying mountain posts. By midnight on that date most of them were in operation and by sunset of the following day practically all were manned. Shortly after, the Army with plenty of problems of its own to handle, turned over the job of administration of these back country posts bodily to the Forest Service.

The work was carried on all during 1942 and much of 1943 on fourteen of the eighteen national forests of California, the last fringe of almost a hundred posts nearest the seacoast continuing in operation until June 1, 1944. At the peak of the activity, 288 of these mountain posts were being operated in California, 224 of which were Federal, and 64 State and County. Sixty of them were located in remote sections of the Mojave Desert. The mountain posts, which served the dual purpose of fire lookouts and aircraft warning stations, ranged from locations just above the ocean shore on Los Padres National Forest to Shuteye Peak in Madera county with an elevation of 9,022 feet and Jordan Peak in Tulare county, 9,100 feet above sea level.

The hardships suffered by the Forest Service personnel carrying on this work - fighting blizzards, deep snows, intense cold and heat, loneliness and isolation - was somewhat akin to that endured by men

on the actual fighting fronts and is a saga written in thousands of post log books now in the hands of the Army. Yet a military secret is the degree of closeness of California to enemy attack by air during these first war years.

In connection with the Aircraft Warning Service, soldiers and foresters worked together closely in the early months of 1944 on a somewhat unusual activity. Several high altitude posts on Los Padres National Forest were buried beneath snowdrifts seven to ten feet in depth by snowstorm of unusual magnitude. Pack trails were closed making the posts inaccessible to mules. Although large stocks of fuel and supplies had been laid in during the previous fall, spoilage and miscalculation of amounts needed to carry through resulted in the supplies at these posts becoming dangerously low.

The Army and Marine Air Corps came to the rescue with the loan of large bomber and transport planes. Forest officers packaged the needed supplies and attached the same type of freight parachute as that used for delivering supplies on back country fires. Joining with the armed forces the local foresters delivered the packages to the marooned observers. One daring pilot flew so low that the observers thought the plane would hit the top of the lookout house. Accurate "bombing" was necessary since a near miss would mean hours of almost impossible plowing through soft snow to reach the supplies. Several packages dropped right on the catwalk of the lookout, one parachute and its attached package draped itself over the ridge of the roof and under the influence of a heavy wind another actually side-slipped under the building. A crate of oranges broke from the jerk of the opening parachute and sent down a regular cascade of yellow oranges around one of the posts.

As might be supposed, the sight of the billowing parachutes engaged in the first delivery of mail and supplies in months was a welcome one to both men and women observers on their isolated posts.

Rural Fire Hazard

Although gasoline shortages and travel restrictions cut down the recreational use of wild lands during the war years, a substitute war risk was the hundreds of thousands of troops securing their basic training on California's vast wild land domain. Not that the Army was in any sense uncooperative in the matter of rural fire prevention - quite the contrary - since from commandant to company commander, fire prevention factors were hammered at consistently. However, the explosive nature of California's summer and fall vegetative cover was often a closed book to officers and men coming from less fire susceptible parts of the nation.

Although fires were started as a result of heavy land use by training troops, this fact was somewhat compensated for by the assistance in rural fire-fighting rendered by units of the armed forces. Commanding officers took advantage of the excellent field training which forest fires presented, since more than any other peacetime activity, fire-fighting simulated conditions of actual warfare. In this hazardous occupation, two soldiers lost their lives in the southern California area in 1942 and seven marines died while on fire fighting duties in 1943.

In 1942 the United States Forest Service handled 1,048 fires on California lands. Of this total, 839 were started by human agency, careless smokers still leading the field of accidental fire-starters.

That year 111,374 acres were burned over in the national forest zone of protection, with a resultant fire damage of \$280,080. This was in addition to the thousands of rural fires, including structural blazes, handled by the State and County organizations, on lower-lying lands. Among the county forestry organizations, Los Angeles county alone fought 446 non-structural fires which burned over 18,591 acres and caused damages estimated at \$2,568,118.

Los Angeles county Department of Forestry, charged with fire protection on 1,369,936 acres of unincorporated lands lying outside the national forest area, chalked up 644 rural land fires in their populous county area in 1943. This number of fires was slightly under their preceding ten-year average of 667. Although 18,246 acres of land was burned over by these 1943 Los Angeles county fires, some 15,000 acres were the result of one large fire in November.

Struggling with wartime man-power shortages, the State Division of Forestry showed a less cheering record in 1943 than Los Angeles county. The total number of fires handled by the State rural fire-fighting organization including farmland fires, structural fires and those burning in brush and timberland outside the Federal zone of protection, was 2,330. The timber and watershed area burned over on these State-protected lands totalled 379,907 acres with a damage figure of \$1,457,265. The average area of 1943 fires on this type of lands was 177 acres, 35 acres above the 10-year average.

Less than five percent of these 2,400-odd fires burning on the State-protected lands were caused by lightning, the balance being man-caused. Almost one-third were caused by careless smokers. The State Division of Forestry was now also protecting 1,450,000

acres of public domain lands for the Department of the Interior on which it handled in 1943 fifty-nine fires burning over 36,750 acres. Fifty-two of these fifty-nine fires were man-caused.

General Warren T. Hannum, Director of the State Department of Natural Resources, reported that the State's fire-fighters combatted a total of 1,063 rural fires during the first four months of 1944, an all-time high for that period of the year. These early season fires burned over 5,312 acres of land and caused damage to improvements thereon estimated at \$1,631,328.

Due largely to closure restrictions, the national forests of California suffered less from fire during the second war year than in many previous years. The total number of fires handled by the Federal forest rangers in 1943 was 1,537, as against a preceding five-year average of 1,667. The total area burned over in 1943 was 76,543 acres. Man-caused fires in the public forests of California numbered 689; lightning-caused, 848. Again smokers were responsible for 361 of the fires started by human agency.

The more hazardous areas of the national forests were closed to all forms of recreational use during the war years. Prevention man-power was hard to get and there was little help available to fight the bigger blazes other than that furnished by the armed forces. Many women served as lookouts, fire patrolmen and even as members of the fire suppression crews. Outside of an almost skeleton force of key employees, the bulk of rural fire protection forces - county, State and Federal - were men above draft age and teen-age lads one and two years below the military age standard.

Several Citizens' Public Service Camps, manned by conscientious objectors, were established in the national forests. On the whole, these men, although having religious scruples against fighting human enemies, gave a fairly good account of themselves as forest fire-fighters. In the forest regions in a neighboring state, in fact, "smoke jumpers," trained to parachute from airplanes to back country fires, were largely drawn from this class of men opposed to fighting their country's foes with lethal weapons.

That the forest and rural land fire menace in California and other Western states was fully recognized by the administration is indicated in the passage by the Congress of Bill S.45, an amendment to the Clarke-McNary Act - and its signature by the President on May 5, 1944. This Act increased the cooperative forest fire protection funds available under the original law from \$2,500,000 to \$9,000,000, annually.

Many rural residents, particularly in the northern section of the State, still clung to the idea of rather widespread burning of brushfields. Studies carried on by Arthur W. Sampson and his associates of the Agricultural Experiment Station during almost two decades were summarized in detail in early 1944. The matter was an important one, since some seven percent of the land surface of California is covered by pure chaparral stands.

These investigators supplemented their field surveys by laboratory studies and one of the first conclusions reached was that the vast chaparral areas of the State could in no way be blamed on early Indian users of the land, and that broadcast burning practices by later white settlers reached their peak in the 1880's.

They learned that in the brush masses which form the chaparral growth there were two general species, the non-sprouting kind which could be killed out by fire or cutting, and the sprouting type which could not. On most areas experimentally burned, they found the forage better for a year or two, after which heavy invasion by poisonous plants occurred. Another offsetting factor was that after burning, the recurring chaparral had a decided tendency to spread over and take possession of adjacent, formerly brush-free grasslands.

They decided that so far as northern California was concerned there was no particular soil erosion problem involved when brush areas were burned but that in any extensive fire there was a heavy loss of game, fish life was killed through impregnation of creek waters by ashes, and that there was usually heavy damage to improvements on surrounding farmlands.

Dr. Sampson's long-time study brought forth the frank admission that burning, if properly controlled, was good business on areas of level land and on gentle slopes where good soil existed, and although widespread burning practices were formerly quite universal in northern California, of late years only the type of brushland which could be used for farming or for good pasture land was now burned off by the more progressive ranchers and stockmen. Among a large number of northern California brushland owners canvassed, almost half were opposed to burning at all, preferring to accomplish necessary brush control by handcutting of the chaparral or removal by the use of bulldozers.

To properly burn, that is, to make a fairly good job of clearing off the brush and still have the clearing fires under human control at all times, costs were unjustifiably high when applied to steeper hillside lands worth at the most for pasture purposes, \$3 to \$5 an acre. Sampson's investigations showed the average costs for a

single burning to be 25 to 85 cents per acre to the private landowner, plus 27 to 40 cents per acre for State supervision, and this without considering quite possible losses should fires get out of hand.

In the southern section of the State where some few farmers and stockmen still advocated broadcast or strip burning of hillside lands, the situation was entirely different. Here the chaparral slopes not only formed the watershed sponge so vital to the very existence of adjoining communities, but the geological structure was such that any removal of protective vegetative cover meant almost limitless soil erosion. Each new test, investigation and experiment proved the advisability of keeping fire out entirely from steep hillside lands.

It may be said that if promiscuous burning of wild lands is proper, then California legislators from 1872 on must have been wrong; two generations of Federal and State foresters must have been wrong also; a lot of soil erosion and silted stream channels from which lands are suffering must be imaginary; accelerated floods of the past did not happen; reports on decades of tests and experiments by officials of irreproachable character must be erroneous. Broadcast or strip burning on any large scale is essentially uncontrolled burning, a menace to California land use.

Outdoor Recreational Land Use

To meet the military demand for a reduction in the forest fire risk, the State Division of Fish and Game closed the deer hunting season entirely on the national forests of southern California in 1942. As a wartime measure, other considerable areas throughout the State were closed to nimrods also that year.

By 1943, concentrated war production efforts had somewhat assured a stockpile of food and materiel and tired workers, whose outdoor recreational hobby was hunting and fishing, cast longing eyes towards the high hills. On the importuning of thousands of hunters that they be allowed their annual hunt, the State's game management agency substituted a winter deer hunting season, in lieu of the normal late summer period in southern California, on the last 21 days of 1943.

From the standpoint of the guardians of southern California's national forests, the winter deer season was a success. At least the fire risk inevitably resulting from the presence of thousands of people in the wild lands during the active fire season was removed. From the hunters' standpoint, the winter deer season was generally classed as a failure. On the basis of this single year's

test, it is quite true that the deer were slightly leaner, weather conditions were uncomfortable for the hunters.

Of 500 deer taken on the four national forests located in southern California during this experimental winter deer season, weights averaged eight pounds lighter per animal than the average taken in previous years during the late summer hunting season. However, due to cooler weather conditions, there was in favor of the winter season the elimination of meat spoilage which normally amounted to 25 percent, or more, of the season's kill.

California's deer population was steadily increasing and in some areas constituted a serious menace to crops and to range pasturage needed for domestic stock. More than ever during wartime the annual harvesting of the deer crop became a major land use problem, and the supplementary meat supply was also an item not to be sneezed at. Conservationists and wild land guardians scratched their collective heads over the problem presented in maintaining a proper balance between allowing hunters their annual sport in keeping the deer population at normal and at the same time combatting the fire hazard brought about by an army of users faring forth during the heat of the fire season over wild lands, ill-protected during a period of war man-power shortages.

In spite of gasoline restrictions, deer hunters did pretty well in 1943. Foresters reported a collective buck bag of 6,460 black-tailed deer and 14,255 of the large mule deer species killed on the national forests of this State that year, this number out of a total estimated deer population of 422,000 animals.

Including 1,700,000 acres within national parks where hunting is not allowed, California had 4,200,00 acres in deer sanctuaries. Several large game refuges or parts thereof were thrown open to hunting in 1943. As the result of a study ranging over several years, F. P. Cronmiller, Assistant Regional Forester, U. S. Forest Service, late that year released some interesting factual data pertaining to the protection value of these refuges. This data caused wild life conservationists to wonder if perhaps more public lands might not be opened to public shooting and a fair level of deer population still maintained.

Cronmiller's figures indicated that in many of these large refuges, some of which had been closed to shooting for several decades, there was apparently little greater deer concentration than in areas which had been left open to hunting. The study seemed to indicate that with proper legal restrictions such as a sensible bag limit, properly established hunting seasons, and protection of migratory routes, deer would take pretty good care of themselves

in their native habitat. Moreover, a couple of million acres additional land open to public shooting in good deer country would provide thousands of California nimrods with more elbow room for their sport.

Ducks Unlimited, a national organization dedicated to the conservation of migratory waterfowl, was in a large measure responsible for immense increases in California's shore bird population. Other species of wild life showed encouraging increases, notably furbearers, but many amateur and professional trappers were with the armed forces and the take of wild furs during the war years was comparatively light. By 1943, the introduced muskrat had become one of California's most important furbearers and colonies of the animal existed in 26 counties of the State. Some 70,000 muskrat pelts were taken that year.

Splendid work was being done by the State Division of Fish and Game and the U. S. Bureau of Fisheries in the propagation of fish, both for commercial and sport fishing. The State organization greatly reduced the cost of fish rearing and distribution by establishing smaller hatcheries closer to the streams to be stocked or restocked. Their basic platform was the planting of fish in all State waters with the species best adapted thereto.

A very unwelcome species of wild life was pushing down from the neighboring Pacific Coast States into California mountain lands. This new emigrant was the mountain beaver or "boomer," an animal which had nothing in common with his famous namesake so intimately connected with Western history except a similarity in appearance and a decided fondness for young tree growth. His night-prowling depredations played havoc with young spruce, Douglas fir and redwood.

His fur is valueless and from a farmer's or forester's point of view, he has not a single redeeming good quality. Difficult to trap, the control of these invading rodents will add another post-war problem of timber protection.

Although, as stated, travel restrictions and the wartime tempo of work pushed outdoor recreation pretty well into the background, there were over two and one-half million visitors annually to the more easily-reached areas of California's national forests during 1942 and 1943. Many of these were personnel of the armed forces, army units in some sections moving into public campgrounds for weeks at a time, where in a more restful atmosphere they were able to carry on the military training started in desert areas or in hot valley camps.

The great hostelrys of the national parks were thrown open to the armed forces and proved invaluable rest and recuperation camps for the nation's fighting men. For wartime relaxation, there were now also 56 State parks, including unusual beach, mountain and desert areas, many of them fairly close to populous centers.

Other Wild Land Protection

As though in sympathy with the need for all-out war effort, the depredations of the pine bark beetle were at a low ebb during the years 1940 to 1943, inclusive. War priorities postponed the fight against this ravager of pine timber lands. So much as possible, however, insect infested trees were removed simultaneously with logging operations on both public and private lands. Even with the minimum endemic infestation of recent years, losses by pine bark beetle attack have been much greater than California's timberlands can afford.

Even in wartime, the threat of white pine blister rust to the fine sugar pine stands of California could not be ignored. Crews of teen-aged boys, led by older foresters, battled this timber-killing parasite marching south through the California mountains. Federal foresters felt they were pretty well ahead of this invading timber scourge as they carried on control operations on five of California's national forests far down into the central Sierra Nevada. During the summer of 1943 eradication work covered 27,350 acres and a total of 3,260,000 shrubs of the Ribes family, without which the infestation cannot spread, were grubbed up by the forest pathology crews.

Although dealing more with cultivated than wild lands, the work of the Soil Conservation Service greatly progressed during the war years. Farmers were becoming acutely conscious of topsoil values. By the spring of 1944 there were 27 organized Soil Conservation Districts in California with 19 more in the process of organization. In addition, 14 of the districts already organized had added additional area. The work of this Government agency in pointing the way to better land use and management greatly contributed to increased food production.

With more than three-fourths of the area of their State embraced in wild lands, the great war brought home to Californians more than ever not only the value of the natural resources contained in these lands themselves, but a consciousness of the large part such lands played in the best use of cultivatable areas. Proper conservation and management of timber, oil, forage, fish, wildlife and other natural resources became more than ever a recognized responsibility of the average citizen and taxpayer.

Synthetics and Substitutes

It is perhaps somewhat hard to visualize an affinity between the warm flow of milk being extracted from a cow's udder and the fountain pen with which these words are being written, yet the chances are very good that the barrel of the writing implement had the same birthplace as the cream used on the morning cereal.

Even before World War II, California in company with Wisconsin and New York States, led the nation in the production of casein, a solid which forms about three percent of the contents of raw milk. By a fairly simple process casein is extracted from whole milk without robbing the milk of its food value. Converted into rice-like granules, it is used in the manufacture of a wide range of articles made from plastics and to a large extent also in the textile, paint and other industries. It takes but 8 gallons of skimmed milk to make one pound of dry casein. Billiard balls, combs and imitation celluloid are a sample of the wide range of items made from this substance. The war demand for California casein was high, since manufactured into high grade glues, this by-product of the dairy industry entered extensively into airplane manufacture.

With war demands for food, there was simply not enough butter to go around. Butter substitutes in the form of oleomargarine, manufactured from various vegetable oils, took a leading place on the family table during wartime. Oleomargarine, or synthetic butter, had been the subject of bitter contests for many years between its manufacturers and dairy interests. Even when real butter could not be purchased by the housewife at any price in cash and food ration coupons, every ban legally possible was placed on the synthetic product by the well organized dairy interests - a good example of the power of rural cooperatives. When furnished to patrons of eating establishments, the law required oleomargarine to be served uncolored and unpalatable-looking and the caterer concerned to widely emblazon the fact that the product served in his place of business was not butter.

Cork was a valuable war material. Previous to the time when war demands placed cork high on the priority material list, 150,000 tons of raw cork per year was being used in the United States. All of it came from Spain, Portugal and North Africa. With imports almost entirely shut off by the war in Europe, cork supplies to manufacturers were already being rationed during the first months of 1943.

Spasmodic planting of cork oak started in California as early as 1858 when the Government brought in a shipment of cork oak acorns

from Spain. Due to the lack of any motive for cork production, these early experiments met with indifferent success. The State Division of Forestry continued cork oak propagation on a small scale and distributed throughout the State an average of 260 seedlings a year between 1930 and 1940. When war pressure came it was found that fairly large trees were doing quite well in 21 different California counties as a result of the pioneer plantings and the later distributions by the State's foresters.

The amount of cork available was infinitesimal, of course, compared with national needs, although one 90-year old tree in Napa county produced slightly over 1,050 pounds of cork in 1943, the largest production from a single tree yet recorded in the United States. California cork was but slightly inferior to the imported variety, and raw cork bark had gone up to six cents a pound in 1943.

Sponsored by the Crown Cork and Seal Company and headed by Professor Woodbridge Metcalf, Extension Forester of the University of California, a considerable program of cork oak propagation was started in the immediate pre-war years. The United States Forest Service, State Division of Forestry, County forestry departments and private firms and citizens participated in the work. By March 31, 1944, 125,000 cork oak seedlings had been planted in various sections of California on Federal, State and private lands and a tentative program planned for the ultimate establishment of 100,000 acres of cork oak woodland on the lower-lying national forest lands of the State.

Meanwhile, the familiar dockside cork bumpers were being replaced by very satisfactory ship fenders made from Douglas Fir sapplings and bubble glass floats were being employed to provide buoyancy for life rafts and fishing nets. The Navy had banned cork linoleum from its battleships, and the small national stockpile of imported cork was being carefully hoarded.

By her conquest in the East Indies and Malay States, Japan in early 1942 controlled over 90 percent of the world's supply of natural rubber. America virtually lived on a cushion of rubber, a material which was a component part of almost all the equipment of warfare, as well as filling a thousand daily civilian needs. With the stockpile dangerously low, our national situation with respect to this universally-used material was decidedly bad. Synthetic rubber could be produced from cereals, from mineral oils and from other sources and all haste was made in getting synthetic rubber plants into action. Even the best synthetic rubber, however, fell somewhat short in the elasticity and durability of the natural tree product.

In the light of tests of various rubber-bearing shrubs made through preceding years, the Government decided that the Mexican shrub, Guayule, which yielded the same kind of rubber as the Hevea tree of the East Indies, offered the quickest and best solution to the problem of natural rubber production. The resulting Emergency Rubber Project, as the Guayule production program was called, represents one of the most interesting and unusual uses of California rural lands.

Guayule, a native of Mexico, is a semi-desert shrub closely resembling a stunted edition of the familiar purple sagebrush of our Western plains. The best strains of the plant contain over 20 percent of pure rubber, from the leaves clear down to the roots. Its possibilities as a replacement for the rubber trees of the distant tropics in the event of war was recognized and endorsed by a military commission headed by General Dwight Eisenhower several years before war actually blazed forth in the Pacific.

The production of Guayule rubber had already passed the experimental stage in California since for over twenty years the Intercontinental Rubber Company had been turning out as much as five tons of Guayule rubber daily in its plant at Salinas in Monterey county. By a law enacted on March 5, 1942, the Government took over the factory, plantation and stock of seed of this company and created the Guayule Project, turning the administration thereof over to the United States Forest Service.

Within a matter of days work had been started on the project by this Federal agency. With the central manufacturing plant and plantations located at Salinas, nurseries were established also near Indio, Oceanside and Bakersfield, California; in the Mesilla Valley, New Mexico, Salt River Valley, Arizona and in the Lower Rio Grande Valley in Texas. Inside of a year almost 30,000 seed beds were growing Guayule seedlings, sufficient to plant within another year over 200,000 acres. These seed beds were laid out on a standard width of four feet and the forester-managers of the project estimated that if laid end to end they would reach clear across the continental United States.

Land was leased from farmers in the different areas; seedlings were distributed to private land owners in lots of thousands, and wild guayule shrub was collected from various sources and processed through the Salinas plant. Although an exceedingly small supply in the face of total national needs, the Salinas factory by March, 1943 was turning out five to eight tons of rubber daily.

The job was a tremendous one. Forest Service mechanics had even to develop and build the equipment necessary to collect the seed,

plant and harvest the crop. A planting machine was invented with which trained field workers set out a seedling per man - or per woman - every second. Another machine, built on the principle of a housewife's vacuum cleaner, was used to collect the fine seeds from the plants.

Soil in the seed beds had to be worked into a dust-like fineness, kept entirely free from weeds and never allowed to dry out for a single moment. Necessary research work, participated in by several Government bureaus, was almost unlimited; camps to house workers had to be built in the open fields, and the country scoured for materials to keep the project operating at top speed.

The aggressiveness of the Federal foresters, detailed from all sections of the nation to aid in the work, was attested to by Congressional Committees investigating the progress of the National Defense program. The House Committee asserted:

"The project (Guayule program) has been placed under the jurisdiction of the Forest Service which has approached the duties promptly and with characteristic effectiveness."
The Senate Committee ventured the statement:

"The Department of Agriculture has cut through much red tape....A project is now under way which will produce a substantial quantity of rubber several years from now.... The emergency program can become a permanent backlog for the total rubber production in this country----None of them (Goldenrod, Koksaghyss, Rabbit-brush, etc.) at the present time is as promising as Guayule for domestic growth in the United States."

Guayule reaches the peak of its development at five years of age when an average return of 1,600 pounds of pure rubber per acre may be expected from the best lands. In the face of urgent national needs, the project managers figured that by forcing processes a fair crop could be harvested in three years with an average harvest of half a ton of pure rubber per acre.

Perhaps unfortunately, sections of California with soil and climate best adapted to the growing of Guayule also represent lands of the highest value for intensive food production. Weighing the advantage of one against the other, the Government finally turned back to the farmers many thousands of acres of agricultural land leased for rubber production. Thus by the spring of 1944, only 32,000 acres were devoted to the growing of Guayule, as against the half million acres authorized by the Congress and the 208,000 acres in the three States which the Federal foresters planned as having planted by June 30 of that year.

In the meantime, while immense synthetic plants even turning out a fair rubber substitute, and Allied supremacy gained over the enemy submarine menace in the Caribbean waters had resulted in resumption of limited shipments of natural rubber from South America, the Federal managers of the Emergency Rubber Project had a stockpile of Guayule seed in safe storage. They also had ready the necessary working equipment to expand Guayule acreage to any size demanded by national interests.

There is little doubt that the research work now being carried on will eventually result in the adaptation of second rate, and perhaps third-rate California lands, now idle or lightly used, for the production of Guayule to provide the rubber cushion on which modern America travels and rests.

Erwin M. Schaefer, a wealthy German chemist and manufacturer, did not like the Nazis and the Nazis had no love for him. They took his wealth away and threw him in jail but he managed to escape to the United States just before our country declared war on Germany. Locked in his brain were trade secrets of great value to the free America to which he had fled. Our war participation was almost a year old, however, before Americans would listen to his well developed plans for manufacturing alcohol from wood waste. In November, 1942, Schaefer reached the ear of Dr. Alfred J. Hall, Principal Biochemist of the U. S. Forest Service and turned over to him the formulas by means of which a ton of plain, ordinary sawdust would manufacture half a ton of sugar, which in turn would yield 50 gallons of alcohol.

The nation in 1944 needed 640 gallons of alcohol for the manufacture of explosives, synthetic rubber, textiles and other materials, with prospects of 50-million gallon shortage. Also, alcohol was being manufactured from vitally-needed food products. It is not surprising, therefore, that the Government scientists grabbed at the German refugee's formulas and soon several plants were planned to utilize the alcohol content potentialities of the immense sawdust piles of the Pacific Coast. Although the only plant of this nature so far actually under way is located in Oregon, undoubtedly the day is not far distant when the waste from California sawmills will replace, in part at least, the food cereals used in the production of industrial alcohol.

California forests were providing a considerable variety of war-time substitutes. Local tanbark oak was to a certain extent replacing the imported product; half of the marine piling for the State's immense war industries were being secured from local sources; incense cedar was replacing the Southern red cedar in the manufacture of pencil slats; Pacific Coast dogwood was being used

in lieu of Eastern dogwood for textile shuttles; redwood bark fiber, to the extent of as much as 40 percent, mixed with cotton and wool, was producing a very creditable type of cloth besides filling other uses where a tough, fibrous material was required; as a fair substitute for the genuine quinine made from the cinchona shrub, the native habitat of which was in Japanese hands, extract from the leaves, bark and roots of the California Garry oak shrub had found a place in the nation's medicine chest. And in Giannini Hall at the University of California, an exhibit of a wide array of items manufactured under war necessity from wood and forest products was an impressive example of their adaptability for diversified use.

California Cooperatives

Rather detailed comment has been made elsewhere in these pages on California rural cooperatives. The history of the State is replete with instances of the success of individual land users brought about through being banded together by a common purpose. Material wealth ceases to have any great value to the owner if acquired without effort, and rural cooperatives the world over merely represent collective efforts of individuals engaged in private enterprise for the amassing of means to provide them a fuller way of living. Government direction - without regimentation - is a fine thing; Government subsidy in the form of outright gift is not, as has been proven in the State's own history of rural land use.

It is a far cry from sea-girt Denmark to Sunny California, yet in the matter of rural cooperatives there is somewhat of a common bond between the sturdy, independent Danish farmer and the California agriculturist. Many of California's ideas in the matter of rural cooperatives were imported from the little Scandinavian kingdom.

Some 75 years ago Denmark was a land of tenant farmers, the actual land workers being little better than serfs, their lands impoverished and their standards of living low. Just prior to the recent German occupation, through the building up of farmer cooperatives, 97 percent of the Danish farmers, living in comfort and independence, owned their land outright. Denmark's 1,400 rural cooperatives included 192,000 of its 206,000 farmers, 80 percent of whose farms embraced less than 150 acres.

In 1942, California led the States of the Union in the matter of rural cooperatives of which there were 461, large and small, including 86,690 members. That year these farmers did a gross business of \$289,170,000 through their organizations. The Central California Poultry Producers alone involved transactions of \$37,500,000 and the value of the products handled by many other individual rural cooperatives ran into figures exceeding tens of millions of dollars in the second war year.

In that year of 1943, the California Fruit Growers Exchange celebrated its 50th anniversary. Its membership now exceeded 14,500 individual fruit growers, including 25 different exchanges made up of two or more local associations. It was operating 241 packing houses in handling 75 percent of California's citrus crop, shipped 100,000 cars of fruit annually. In 1943 this great cooperative was responsible for the manufacture of approximately 2,800,000 gallons of orange concentrate and 1,200,000 gallons of lemon concentrate for the use of the Nation's armed forces and for Lend Lease shipment. These concentrates represented a reduction in bulk from the raw product of thirty to one, an important factor in saving badly-needed shipping space.

The value of these rural cooperatives in wartime was demonstrated in transportation savings, in conservation of man-power; as a ready medium for the dissemination of the crop information necessary for the farmers to have in their production efforts; in the centralizing of purchasing and distribution of seed, fertilizer and equipment; and most of all, in the financial protection of the interests of the farm industry represented.

One instance of the value of rural cooperative effort concerned a reciprocal treaty tentatively negotiated with Iran by the central government. This treaty greatly favored imports from that nation of the same type as special California-grown products such as almonds and dates. California farmers expressed their protests against the measure through 13 leading State cooperatives and were joined in their condemnation of the proposed move by the Farm Bureau, Grange and leading bankers.

These organizations quite sensibly pointed out that farmers growing these highly specialized crops would be forced by this pending foreign competition to turn to the production of staple farm products, some of which were still the subject of Government subsidies, while the growers of the special crops had never asked for or received Federal financial aid. The cooperatives won their fight and dates and almonds were left out when the treaty was finally consummated.

One of the finest examples of both community cooperation and a deep love of the land during recent years is that marking the rejuvenation of the 10,000 square miles of mountain, desert and farmlands of which Owens Valley is the approximate center.

When the people of metropolitan Los Angeles won their fight for the possession of Owens Valley water, they paid the hundreds of farmers involved the full value of their lands, and perhaps a little more. The huge buying power of the distant metropolis, however, purchased

more than the land and its contingent waters - it brought the contentment and happiness of a rural population wedded to lands which their immediate forbears had converted from raw wilderness into independent, prosperous farmsteads.

As Los Angeles developed the Owens Valley water for her teeming population, dry watercourses, parched lands, dead trees and buildings falling into decay were a feature of the former smiling agricultural landscape. The older residents, pioneer American stock, moved to the little towns of the Inyo area, these urban centers themselves duplicating the run-down forlornness of the surrounding land. The younger generation scattered to the four winds of heaven.

It was somewhat of a modern version of Longfellow's Acadians. The old timers sadly shook their heads as they reflected that the Long Valley Dam which would have saved their beloved valley from decay could now never be built, although its storage of excess flood waters would supplement rather than in any way lessen the metropolitan water supply used over 200 miles distant. The former thriving towns of Lone Pine, Independence and Bishop had sufficient water to drink but not enough for lawns, gardens or normal population growth.

On to the scene stepped Father John J. Crowley, a former parish priest. Afflicted with an apparently incurable disease, he came back to die in the section of California he so dearly loved. The condition in which he found the land that was the scene of his former labors, and the resigned apathy of its people, pushed his own physical disability into the background. His character a combination of Father Junipero Serra, John Sutter, George Chaffee and Will Rogers, he plunged into the work of rehabilitation of the Owens Valley area. He organized a cooperative known as the Inyo Associates which was soon battering at the doors of the Los Angeles civic government demanding financial aid in the rejuvenation of Owens Valley lands, of which metropolitan interests owned 90 percent.

The Irish-American priest, discarding his clerical vestments for the rough khaki habiliment of the tourist and desert dweller, travelled day and night exhorting and preaching the gospel of cooperative effort. Without funds himself, he often slept right in his battered flivver and secured his meals from the hospitable valley residents. Every dollar he collected went into the cooperative which had for its object the betterment of the Owens Valley area.

Catholic and Protestant alike; professional man and dispossessed farmer; newspaper editor and merchant; clubs and lodges, fired with a new spirit, united under Father Crowley's banner. The local cooperative, with something real to offer the public, used all the

latest tactics of modern Chambers of Commerce and the priest's own written descriptions of the wonders of the Inyo country - fishing, hunting, mountain and desert scenery - gained national attention. Father Crowley lectured in Los Angeles, and drew thousands to hear him celebrate Mass in the rugged wastes of Death Valley and on the top of Mt. Whitney.

One of the projects sponsored by the Inyo Associates was a road from the upper slopes of Mt. Whitney, highest point in the United States, to Bad Water in Death Valley, the lowest. The incidental celebration of the later opening of the road was called the Wedding of the Waters, when with colorful public ceremonies the water from Mt. Whitney's summit was mingled with the desert waters of Bad Water Sink. As an appeal to the Roman Catholic world, Father Crowley projected the Stations of the Cross along this route, representing the progress of the pilgrim from the blistering Hell of Death Valley's awesome wastes to the majestic Heaven of snow-capped Mt. Whitney.

The work of the Inyo Associates bore profitable fruit. Former residents returned to Owens Valley. The valley towns took on a new lease of life. Los Angeles decided to build the Long Valley Dam, and the metropolitan residents, instead of meeting as formerly with biting hatred from the natives whom they had shorn of their lands, were welcomed - in the role of tourists - with open arms. The last year of American peace witnessed a million tourists visiting the far-flung Inyo community and spending locally over five million dollars in the process.

Most of his purpose accomplished, Father Crowley passed on from the scene of his earthly labors. He met sudden death, not as a result of the basic illness which brought him home to die, but from an accident suffered while at the wheel of his battered, fastmoving flivver. The body of water impounded by Long Valley Dam, called Lake Crowley, and the Inyo Associates, are a tribute to his memory.

Calories and Acres

For perhaps the first time in history, Americans generally were really concerned about food supplies and thinking in terms of food calories. In the war years America was feeding her own people at home, her Army and Navy scattered over the far-flung battlefronts of the world, and contributing huge stocks of foodstuffs to her fighting allies. Well fed America could never bear to see people starving anywhere and as Allied conquest progressed there was added the burden of feeding, in part, at least, the peoples over whom the Axis juggernaut had rolled. Strangely enough too, was the fact

uncovered by military conscription, that many of our own people actually were undernourished.

Expressed in terms of energy-producing and nutritive food values, a moderately active man required a minimum of 3,000 calories of food daily; a very active man needs 4,500 calories and a male adult sedentary worker at least 2,500. Women in the same classes can do nicely on approximately twenty percent less. Children one to twelve years of age require an approximate daily average of 1,800 food calories. Growing boys 13 to 15 years need 3,200 calories per day and over that age 3,800; growing girls of the same ages proportionately as much. Considering normal, unavoidable waste, therefore, the amount which the world must produce to properly feed its population is an average per person of 3,000 calories of food energy daily. War, with its tremendous waste and losses, probably came near doubling world-wide food needs.

Both German and Japanese military nutrition standards were high, comparing quite favorably with our own. Countries in Europe occupied by Hitler's legions were slowly starving on average daily allowances of 1800 calories per capita, while the well-fed Nazi soldiers pillaged their fertile acres. People of all ages in Greece were dying by the thousands on a diet representing an average of 1,100 calories per day. The food they had came mainly from America and other outside sources. Even under normal peacetime conditions millions of Orientals are on the verge of starvation; Japanese dominance in the Orient only made bad matters worse.

World War No. II brought home the fact that American peace and security was possible only if the entire world was properly fed at all times. California's tremendous food-producing potentialities became more than ever an important factor in world-wide economics.

In the early years of the war national food experts estimated that the average consumption of food for civilians embraced 3,300 calories daily; that of soldiers, including camp waste, 4,100 calories daily. In the front battle lines this military consumption was stepped up to an average of 5,000 calories daily for days and weeks at a time.

The Army standard ration is well balanced and under normal conditions palatable and tasty. It includes the proper proportion of proteins, fats, calcium, iron and the Vitamin constituents of Thiamin, Riboflavin, Niacin and Ascorbic Acid. Based on this balanced Army ration, nutritive experts figured that while a total of 2,053 pounds of varied foods per year was required to feed the fighting man, the average civilian consumed only 1,454 pounds of the same general classes of food.

The weight of food means little; the type of food everything. Americans have fickle appetites. As illustrative of our finicky tastes it might be cited that the public palate demanded huge shipments of crisp, tasty Iceberg lettuce from California even during the stress and strain of war, while locally-produced foods of of the same nutritive value were available.

Through the press, radio and other public information media and the accomplished fact of actual food rationing itself, the citizenry were being aroused to the need of greater food conservation. Economists and nutrition experts, studying the problem, agreed that the following volume of food, on the basis of 3,000 calories for each man, woman and child, would provide a palatable, well balanced diet. This converted, wartime individual food ration list was prepared by Professor John D. Black of the Harvard University nationally known economist, in his capable treatise, "Food Enough." published in 1943.

FOOD FOR ONE PERSON PER YEAR PRE-WAR AND WAR DIET

<u>Food Item</u>	<u>1941 Consumption</u>	<u>Proposed 3000-calorie War Diet</u>
Whole wheat bread (with 6% skim milk added).....	180 pounds	240 pounds
Corn and other cereals.....	30 "	40 "
Legumes - dry beans, peas peanuts, soybeans.....	10 "	40 "
Whole milk (1 pint per day).....	320 "	400 "
Cheese - evaporated & dried milk, etc. (milk equivalent).....	100 "	130 "
Meat.....	180 "	80 "
Fish and fowl.....	35 "	25 "
Eggs.....	40 "	25 "
Fat (including butter).....	55 "	40 "
Sugar.....	105 "	40 "
Potatoes (including sweet potatoes)	145 "	200 "
Tomatoes (fresh or canned)	35 "	40 "
Green or leafy vegetables (fresh or canned)	75 "	45 "
Citrus and other fruits (fresh or canned).....	*225 "	150 "
	<u>1,565</u>	<u>1,565</u>

(*Best available estimate)

The average housewife, even in normal times engaged in nutritive efforts to maintain the proper dietary balance necessary to keep the husband's waistline around normal and the children growing sturdily, becomes pretty well acquainted with caloric food values and Vitamins during war-time. She learned that the average pound of meat contained 600 calories; a pint of milk 336; a cup of baked beans, 200; 6 slices of whole wheat bread, 500 calories and of similar food values in the kitchen. Economists, however, were studying food values on a large scale basis with reference to relative volume of production per acre of different crops; labor required to plant, harvest and process; transportation weights of various foods, and similar factors.

In 1943, fifty different food and agricultural experts contributed to such a special investigation carried on by the California Agricultural Experiment Station. Rural cooperatives joined with public service land-using agencies in passing on to the State's farmers new slants on the relative value of different foods under wartime production and use.

It is a known fact to most layman that milk is the one universal food for the consumption of human beings from infancy to old age which contains all the elements necessary for bodily health. Three-fourths of the food calcium and over half of the riboflavin as the necessary elements of human food in our own country come from milk. Its high food content notwithstanding, an average acre of farmland devoted to whole milk production produces only 350,000 food calories.

Therefore, if a man lived exclusively on milk alone, one acre would maintain him in good physical condition for approximately 116 days only. No healthy person, though, would care to exist for any length of time on an exclusive milk diet.

The early-day Californians enjoyed good health on a diet largely composed of beef, but land was plentiful and cheap in those days. The fact that it would take some 25 acres of farm and range lands to furnish a 3,000-calorie meat diet for one person meant nothing in the general economic scheme of things of that time. Balanced agriculture had no meaning in 1843, but a real one in 1943.

Four bushels of corn contain four times the calories of food energy of the amount of pork which they produce, yet both the pork and corn are necessary in the average American diet. The California wartime food production program was geared, therefore, to produce the ultimate in food values which would strike a balance when combined with production of other sections to help feed her own people, the nation and the world.

The following figures are believed by experts to represent a fair average food production per acre based exclusively on calories of food energy:

Type of Farm Enterprise or
Agricultural Crop

Approximate Average Production of
Food Energy Calories per Acre

Beans, dry, edible.....	1,000,000
Asparagus.....	175,000
Cabbage.....	865,000
Carrots.....	2,675,000
Corn, (yellow corn meal).....	1,875,000
Lettuce.....	330,000
Onions.....	2,200,000
Oranges.....	1,900,000
Grapes.....	2,350,000
Peas, dry, edible.....	1,250,000
Peanuts, whole.....	1,170,000
Potatoes, white....	2,280,000
Potatoes, sweet.....	1,800,000
Prunes.....	2,575,000
Rice, white.....	2,130,000
Spinach.....	250,000
Sugar Beets (white sugar).....	6,000,000
Tomatoes, fresh.....	400,000
Tomatoes, canned.....	350,000
Watermelons.....	350,000
Wheat (manufactured into whole wheat flour)	1,125,000

Milk, whole.....	350,000
Milk, evaporated.....	340,000
Butter... ..	185,000
Cheese, American.....	200,000
All Dairy Products (combined average).....	285,000
Chicken Enterprise.....	125,000
Eggs.....	140,000
Chickens-fancy meat (Broilers).....	115,000
Hogs.....	500,000
Beef Production.....	46,000
Sheep-raising.....	46,000

If production of food calories alone covered the whole situation, the food problem would be fairly simple to figure out - just divide the number of people to be fed into the number of food energy calories produced. However, there is the problem of balanced menus, transportation of different foodstuffs from the area of production and processing to the points of consumption, and many other complexities.

If it were possible, indeed, for a human being to maintain bodily health on a diet of sugar alone, 1,600,000 acres of California lands

devoted exclusively to sugar beet production, would feed her entire permanent and transient wartime population of around eight million people. On a similar basis of computation, if this population could be fed on an exclusive diet of grapes, four million acres would do the trick. Were it possible for California's wartime population to be subsisted on a straight milk diet, embodying as it does all the vitamins and food energy needed, to feed the people within her borders would require every acre of California's cropland, with all the available pasture land of the State thrown in.

California was producing a large volume of food calories. Besides the vitamin content of California's leading fruit product, she was furnishing the world two hundred billion calories of food energy in the matter of oranges alone.

Professor John D. Black, in his book mentioned above, cites the fact that Denmark, including food exports, in the pre-war days fed 58 persons on each 100 acres of cropland; that on the same basis France fed 80 persons, Sweden 69 people and Italy, 142 people. His analysis showed also that Great Britain during wartime fed 67 percent of her 46 million people on 13 million acres of cropland, plus 19 million acres of pre-war grassland. For our leading ally, this figures out to almost 140 persons per food-producing acre - and it is a known fact that Britishers are on the whole a pretty well-fed people. The new lands of America and of California fall very far below these European figures. While there is no basis of comparison between living standards of the Anglo-Saxon and Japanese, 489 of the latter exist on each 100 crop acres.

The importance of food production as a national and world-wide problem was greatly emphasized by the United Nations Conference on Food and Agriculture held at Hot Springs, Virginia in the early summer of 1943. From all the civilized countries of the anti-Nazi world came delegates to make wartime and post-war plans for the proper feeding of their respective peoples. These expert economists agreed that normally 20 to 30 percent of the people of the United States and Western Europe and 75 percent of the population of Asia and the East Indies were malnourished and that the primary responsibility lay with each nation to see that its own people had the food needed for life and health.

This conference of national leaders emphasized that fact that there had never been food enough to insure the health of all people; that the production of food must be greatly expanded, and that now the world recognized this problem and had the knowledge to insure freedom from Want for everyone.

California's fertile acres, with their wide crop range, were assessed with a still greater responsibility in the world-wide food production.



California's High-Priced Lands

Not only did urban property adjacent to the big war plants jump in value during the war years but the selling price of rural lands in many parts of the State greatly increased also. A small farm near Stockton sold in 1943 for \$12,000. Two weeks later the same farm changed hands for a consideration of \$16,000. Large land holdings were still a commonplace matter in California and judging from the price alone some small tracts of farm land might well be called "big little ranches." The following five farm listings of mid-1943, all by one realtor, are quoted verbatim from the advertising columns of a leading Southern California newspaper:

100 acres in alfalfa. Every inch of this property is irrigated with 12 in. concrete pipe. Two wells pump 200 in. of water. The soil is suited for vegetable or flower seed. Price \$45,000.

61 acres. This is the best little ranch with the biggest income in the county. 17 acres in tomatoes, 5 acres in corn, 39 acres in alfalfa. This entire property is under an irrigation system. Price \$25,000.

Strictly cattle ranch. 100 miles square. 90,000 acres in feed. Control 1,000,000 acres of pasture. 12,000 head of cattle, 40,000 head of sheep, 1,000 head of best horses. Price \$1,500,00 cash.

Citrus ranch. 110 acres with beautiful home and good income. Price \$160,000. Terms.

Small cattle ranch. 2,000 acres. Will carry 400 head of cattle. Good Spanish home. Other improvements. Price \$100,000 cash.

The Di Giorgio Farm in Kern County with a gross area of 8,000 acres in 1943 had 1,800 acres in plums, 1,200 acres in asparagus, 3,300 acres in grapes, besides peaches and other fruit. The huge volume of diversified production of this one California farm required 2,000 employees at the peak of the harvest season.

Californians generally were not at all modest in their estimate of the value of their lands and the natural resources contained therein. Only high value California lands could justify a Boulder Dam, the great Owens Valley and Colorado River Aqueducts, and the immense Central Valley Project. Incidentally, lest it be thought that Los Angeles had overreached itself in development dreams, let it be said that in November, 1943, the assessed valuation of

tangible property in Los Angeles County was \$2,778,026,265, thirty-five percent of the State total.

To further solve land use problems based on water control and distribution, we find a California engineer advocating as a post-war project one immense rock and earth dam, 600 feet wide, across San Francisco Bay from Richmond to the Marin shore and another 2,000 feet wide between San Francisco and Oakland, paralleling the Bay Bridge. In this plan, closely available rock and dirt for the proposed construction would be taken from the surrounding hills. These dams, it was said, would form fresh water lakes above the structures with the Pacific waters beyond and, in solving the salinity and navigation problems, reclaim thousands of acres of marsh lands surrounding the San Francisco Bay region. Crackbrained as this gigantic scheme might sound, it was little more so than Colonel Robert Marshall's plan appeared in 1919, a plan which 20 years later crystallized into the Central Valley Project.

In the face of the tendency to cash in on rising land prices, A.B. Crocheron, Director of the Agricultural Extension Service for California, in an address before the annual meeting of the California Farm Bureau Federation at Santa Cruz on November 16, 1943, painted a word picture of rural California conditions. He stated that in 1910 almost seven percent of California's land was being farmed and that in 1940 the area was the same except that it was bearing a different type of crops and more intensive farming methods were being used.

This chief of California's farm advisors asserted that in 30 years the number of mortgaged farms had risen from 40 to 50 percent, and that there was an ever-increasing tendency on the part of California farmers to depend upon Government subsidies rather than on their own two-fisted individual and collective efforts.

Crocheron predicted that just as the auto had taken the place of the horse, in 30 years more the airplane will have supplanted the auto and that much of rural California now in farms would be suburban. California, he stated, would be a food importing State, a considerable portion of its agricultural products coming from the Middle West.

In a plea for rural stability, Crocheron told the State's farmers:

"In the pleasant climate of California the ownership of a material amount of good farm land will be a highly-prized asset. A fertile farm of reasonable size will constitute a heritage which will guarantee economic security. Under such prospects, farmers will do well to hold the land and to tell their children and their grandchildren not to sell the farm. However, if California farmers insist that the Government shall cure their troubles by gifts, grants and subsidies, then, thirty years hence the Government will own the land and the farmers will be tenants under the direction and control of a federal bureaucracy."

That great financial advisor and land lover, Roger Babson, in writing his messages to the nation, in 1943 counselled sticking to the land as the basis of all values. In one release to some 350 newspapers, calling attention to the fact that his own small family holdings had been intensively farmed for 100 years without deterioration of land, he asserted:

"My grandfather, who owned (his) farm, never saw the inside of an agricultural college. The farm consisted of only a few acres, plus wild pasture and woodlots. On it he raised seven able children and died at 76 without owing a penny but leaving a good estate in government bonds. Moreover, he never received any government aid or advice from county agents. I believe we must either go back to nature's method of farming or else use more synthetic foods - - -

"God intended that most of us should live on the land and that all should spend some time working the land. The cycle was to raise the food for both man and beast from sunshine, water, air, and the minerals of the ground. Then these minerals would return back to the land in a natural way; while all of us would do some work with our hands."

Federal Land Ownership

Considerable concern was expressed by the California press during 1942 and 1943 relative to the increasing interference in State affairs by the Federal Government, -- as proven by past history, an inevitable consequence of war. The purchase of large areas of land for Army and Navy bases and for military training areas loomed conspicuously in the field of Federal land acquisition.

Many critics of Federal land ownership included in their figures millions of acres of land which for many decades could have been had almost for the taking but were not, simply because they could not be adapted to profitable private ownership and use; nor did these critics credit the fact that millions of acres of privately-acquired lands, with real natural values, were being exploited or misused, and that other millions of acres of sub-marginal farmlands, deserted by their owners had been, and still were, an indirect drain on the public purse.

The California State Board of Equalization in late 1943 prepared a statement of Federal land ownership in the State, as compared with pre-war years. These figures, as of September 1, 1943, showed a total acquisition of lands by the central Government since 1938 of 1,265,698 acres, with an assessed valuation of \$97,415,986, and a consequent loss in taxes to the State of \$2,513,299.

This State report gave the total Federal ownership as 42.87 per- cent of the land area of California, or 43,025,682 acres, having, the summary stated, a potential assessed valuation of \$319,472,986.

The United States Department of Agriculture Coordinating Committee on the Post-War Program report of February, 1944, prepared by 18 Federal and State land use administration agencies, increased the Federally-controlled acreage somewhat when it showed detailed figures as follows:

<u>Ownership</u>	<u>Acres</u>
National Forests.....	19,553,000
National Parks and Monuments.....	4,230,000
Grazing Districts (Interior Dept).....	3,682,000
Indian Lands.....	679,000
Bureau of Reclamation.....	267,000
Fish and Wild Life Service.....	38,000
War and Navy Departments.....	1,921,000
General Land Office.....	12,993,000
Other.....	11,000
Total Federal Land Ownership.....	43,374,000
Owned by State, counties and cities...	5,385,000

The largest Federal ownership of land was in the National forests. However, in spite of the acquisition of large areas of cut-over forest land which would normally revert to the delinquent tax list of the counties in which located, due to transfers to the juris- diction of the National Park Service of lands of outstanding recreational value and other eliminations, the area of national forest land in the State was actually somewhat less than it had been thirty years previously.

The Forest Service, largest Federal land use administration agency in the State, as one of its policies of land use, was avowedly in favor of treating Federal lands in the same manner as private lands as far as standard taxation thereof was concerned, even though thirty-five percent of the gross national forest revenues was already being returned to the State. With private operators cutting on public land, stockmen pasturing their herds and thousands of urban dwellers leasing summer home sites, all on a pay-as-you-go basis, it was quite natural that the Forest Service would continue to greatly favor private enterprise in the use of public lands.

Reflecting this attitude, Lyle F. Watts, Chief of the United States Forest Service, at that time, told the National Lumberman's asso- ciation in convention at Chicago, on December 12, 1943, -

"Our American Democracy is based largely on private enterprise. We want to encourage private enterprise in every legitimate way to provide the production, the employment and the security upon which the welfare of the people depend."

Continuing in his definition of the basic, overall, underlying idea of proper forest land use, the chief Federal forester said:

"To assure ample supplies of forest products within the reach of the man on the street and the farm and to provide a firm foundation for thriving, diversified forest industries."

With continued public criticism of Federal acquisition of land and the fact that many citizens believed large areas of good agricultural, food-producing lands were tied up in military reservations, the War Department in late 1943 called on the Regional Forester of the United States Forest Service in California to make a quick, confidential survey of lands included in some of the larger military reservations within the State.

Forest officers speedily examined seven of the military reservations in California, recently acquired, or enlarged in size, for training of the armed forces in the world war struggle. These included a gross area of 388,243 acres. It was found that the bulk of the area was open or woodland grazing land not suited for the production of crops and that possible cropland formed less than five percent of the total.

The big Hunter-Liggett Military Reservation in Monterey County, with a gross area of 153,865 acres, was classified by the foresters as 41,040 acres of forest land, 107,925 acres of grazing land, and but 4,900 acres of potential farm land. Camp Roberts, located in Monterey and San Luis Obispo counties, and one of the largest military training centers in the nation, contained 2,000 acres of crop land and 42,379 acres of grazing land. Camp San Luis Obispo and Camp Ord had a combined area of 17,036 acres, all of which was grazing or wild brush lands only. Camp Beale, in the heart of Sacramento Valley, covering 85,512 acres, included 11,000 acres of crop land and 74,512 acres classed as grazing land. Wartime use of the extensive lands embraced in Camp Pendelton, formerly the Santa Margarita Rancho, has been detailed in a preceding chapter.

It was not surprising that Californians insisted that the proposition of taxation of Federal lands find a place on the State ballot. The feeling of the people on the matter was shown in the primary election of May 1944 when a big majority of California voters expressed themselves in favor of Federal lands being taxed on the basis of assessed valuation in the same manner as lands in private ownership. With a comfortable nest egg already accumulated in the



State treasury, California apparently intended that all land owners, including the collective national public would help to augment, or at least maintain, a healthy balance in the State's coffers.

State Lands

With a large volume of land now in State ownership, California was very much concerned in putting her own house in order with reference to proper use of public lands and the resources contained therein. It is interesting to note that at a regular routine meeting of the Southern California Council of the State Chamber of Commerce on June 1, 1944 at which over 300 members from nine Southern counties were present, out of 36 major problems acted upon, 18 were directly connected with rural land use and conservation problems.

A wise choice was made by Governor Earl Warren in his appointment on February 7, 1944 of General Warren T. Hannum as State Director of Natural Resources, five days after that engineer-soldier's retirement from active military duty. Serving overseas as a member of General Pershing's staff in World War No. I, during which he was awarded the Distinguished Service Medal and Legion of Merit, since 1941 he had been in charge of military construction for Army Air Forces in the division of action embracing California. General Hannum had just the right combination of knowledge, ability and experience for this office. He knew California well and was intimately acquainted with the State's engineering problems, particularly those pertaining to the State's rivers and harbors and the complex Central Valley Water Project. General Hannum replaced William H. Moore in this position.

California, still lacking several years of reaching the centennial of her statehood, was, in the third war year of 1944, still struggling with the problems of inadequate water supplies, threat of fire and flood, large land holdings and the matter of a proper balance between public and private land ownership; the Golden State was still the Mecca towards which hundreds of thousands of the inhabitants of other parts of the nation were turning their eyes; one of the two major foci with which the Nation was locked in a death struggle was in a sense her former protege, and her shores provided the last glimpse which millions of American fighters would see until this half savage foe would be crushed beneath America's might.

Amidst the complexities of wartime existence, California faced the future with optimistic confidence and unbounded faith in a greater America, - tried and tested in the crucible of war.

CHAPTER XV.

CALIFORNIA: WHAT OF THE FUTURE?

Interdependence and Foreign Relations

Since the title of the closing chapter of this history ends with a question mark, perhaps some of the matter herein should include a series of interrogations also. It cannot be said that the future of California land use is entirely unpredictable. History, written not only in the official archives and current literature but in the trees of the forest and the geological structure of the land, repeats itself, and against any questions which might be asked relative to the problems of future California land use can be set many known facts gained through successes and failures of a century of actual experience.

With the interdependence of states and nations, now such a well known factor in human existence, it goes without saying that the future of California lands must be gauged somewhat on what is happening in other states of the Union, on the Russian steppes or on the densely populated lands of central and western Europe.

The living standards of the teeming populations of the Orient, the races of the South Sea Islands, or those of the Latin American republics, will all have a bearing on future California land use. The fact cannot be overlooked that other climes of the globe, in the aggregate, can produce the same products of farm, forest and mine as those brought forth from the versatile soil of California.

In this connection one might well question to what degree will new markets be opened up in the densely populated Orient or in the Latin-American republics to the south. Will international trade barriers be removed? Will peace pacts to a great extent throw tariffs overboard and insist on world-wide free trade?

As the leading manufacturing nation of the world, how far can we compete with inevitable industrial expansion in other nations having lower wage rates and greater regimentation of labor - Soviet Russia, for instance? What immigration laws will be imposed? To what extent, if at all, will Japanese farmers and fishermen again be allowed the use of California lands.

Government Control and Expansion

Having greatly reduced our natural resources by past exploitation, misuse and recent war demands, will it be necessary to make conservation and proper land use a legal obligation for

one and all? Having become somewhat accustomed to regimentation throughout a war which imperiled the very existence of free enterprise and the American way of living, will we be forced for the sake of future national safety to continue to impose a certain amount of legal restrictions on private endeavor, on the basis of the greatest essential good of the greatest number of people for all time?

There is still the California problem of large individual land holdings, admitted by State official bodies to be a thorn in the side of rural California. The only limitation to such at present is the financial ability of the proprietors to acquire land and to pay the public taxes imposed thereon. Will some maximum limit be placed on individual incomes, a factor already controlled in part through the medium of Federal and State income taxation.

One of the big worries of California land users which will continue to be an issue in post-war years is the mounting Government expenditures, augmented by a decade of economic depression and war. State, county and municipal government costs have increased correspondingly to those of the Federal. The demand for publicly-financed services in California is increasing rather than diminishing, and in view of the values at stake, it appears that peacetime expenditures will continue to increase if we are to care for our natural resources commensurately with their value. These values have been brought home to us pretty forcibly during the years of strife, when less fortunate nations would have robbed us of our heritage.

The latest issue of the California Blue Book graphically illustrates the growth of our State Government alone. This official publication listed 21 departments of the State Government, under which were operating 19 councils, commissions or boards. Under the 21 major Departments of the State, there were also operating 62 Divisions. Some of these are large and far-reaching, such as the Division of Forestry and Division of Fish and Game, both under the State Department of Natural Resources. This authority also lists 35 State Bureaus operating under the Departments or Divisions and 20 independent Boards, Councils, Commissions or Authorities, some of which in turn have Departments or Branches working under them.

These governmental State agencies represent big business. For instance, this 1942 California Blue Book illustrated the fact that the State Controller was handling over two million acres of farm and forest lands deeded to the State for delinquent taxes and, in line with the policy of that Department, had for sale throughout the cities and counties of California "every type of property from a mausoleum to a gold mine, a hotel or an ice-skating rink."



No one can deny the need for more and better education. The required educational and training qualifications of California pedagogues are much more exacting than those of many other states. Even though the teaching profession, whether in rural or urban centers has been pitifully underpaid during pre-war and war years, the expenditures for California's public school system during the 1940-41 year was given as \$199,099,945. During the school year mentioned, student enrollment, exclusive of the State University, totalled 1,920,865. A large part of California's school tax burden represented a population emigrated from other states.

One might ask how much future consolidation there may be of Governmental agencies dealing with land use and natural resources - Federal, State and county. As an illustration of this, perhaps, the case of the Grazing Service might be mentioned. This Bureau, doing a good job in the rehabilitation of over three and a half million acres of the much abused public domain is under the jurisdiction of the Department of the Interior. Apparently, an entirely new Federal Bureau was created only by virtue of the fact that the agency handles domestic livestock grazing on the old General Land Office Lands. These lands are often contiguous to national forest ranges, grazed also under regulated practices by the same livestock producers.

Our California counties were laid out in horse and buggy days and the most isolated settlers are often closer in travel time to the seat of their central State government in 1944 than were their grandfathers to their own county seat. In the course of progress and change will not the future see not only much consolidation of counties but also a considerable melding of Federal and State agencies working along the same lines of endeavor?

Already California is placing the parent Federal Government on the same taxpayer basis as the individual landowner and insisting that all Federal agencies pay local tribute. With this matter looming as a leading political issue, under date of August 4, 1944, the San Francisco Call-Bulletin editorially called attention to the fact that the Federal Forest Service, Fish and Wildlife Service, Grazing Service and Reclamation Service, all paid local communities a percentage of their receipts, while the United States Park Service did not. The editorial illustrated the fact that the four national parks in California embraced an area of 1,700,000 acres, charged a general admission fee, high prices for concessions, and that the National Park Service revenues in California amounted to almost half a million dollars in 1941.

Undoubtedly, the future will see a great deal of activity of the State putting its own house in order in the matter of supplementing rather than duplicating land administration and similar matters.

affecting the general public welfare. The same general rule will probably be applied in the relationship of counties to their immediate parental State Government as in the case of the State to the Federal Government.

Post War Conditions?

The relationship of capital and labor enters very much into the picture of post-war California. Probably, never again, will the farm laborer or farm tenant resume the itinerant, hobo-like existence of the past. On the other hand, he cannot hope to continue his present affluent existence nor collectively, the right of his class to stage strikes, lockouts and production holdups threatening the economic prosperity of the State and Nation.

Neither does California have any desire that its own or the Federal government again turn Good Samaritan and play wet nurse to rural workers and small landowners at the expense of the public purse. The comparatively recent advent of national social security unemployment insurance, and liberalized old age pensions, all pretty well stripped of the element of charity, should do much to revise the living standards of the frequently improvident or financially unfortunate rural land worker.

As the year 1944 dawned, even the most optimistic could not foresee that peace on our own terms would have been achieved years before California celebrates the centennial of her statehood. The transition of war to peace is involving the closing down of plants with payrolls running into billions of dollars annually, and the dumping on the labor market of millions of soldiers, sailors and discharged war plant workers.

On the other hand, needed public works have almost entirely been neglected in construction, betterment and maintenance during the war years; hundreds of thousands of new homes, both urban and rural, are needed, since a large part of California's new population is merely camping out; necessary luxuries of daily living to the tune of many hundreds of millions of dollars, production of which was curtailed during wartime, will be demanded by a post-war population, and the State itself, as well as practically every community therein, has a stockpile of common sense post-war projects, with funds for their prosecution.

California, in common with the rest of the Nation, is quite determined to avoid conditions which were the aftermath of World War No. 1, when a brief boom, followed by economic stagnation, brought about 43,000 bankruptcies, five million unemployed and almost numberless farm mortgages.

Exclusive of the armed forces, the population of California on July 1, 1944 was estimated by State authorities as 8,446,000. All during 1943 new arrivals in the State averaged 42,400 monthly and the wartime increase in population was the greatest of any State in the Union. Among the States, California's 1944 population was exceeded only by New York and Pennsylvania, official figures crediting these States with 12,858,000 and 9,465,00 inhabitants, respectively. Although a considerable number of the newcomers were transients, as stated in the preceding chapter many of them will elect to remain in California permanently. A State population of ten million people by 1950 is, therefore, not only a possibility, but a decided probability.

California will absorb her wartime influx of people just as she did the Argonauts of Forty-nine, the emigrants of the sixties and seventies, and the Dust Bowl migrants of the 1930's. Why not? The gross area of New York State is 49,576 square miles and that of Pennsylvania, 45,333 square miles, each very much less than one-third that of California. A California population of ten million, or even twenty million inhabitants, therefore, will not represent too great a population density as compared to many other prosperous industrial-agricultural states or nations, more especially when considering the factor that so much of the area of the State has a year-around producing season.

Some of the Atlantic Seaboard and Eastern States, part industrial and part agricultural, have a population density of 115,141, 185,285, and up, per square mile. Belgium has 752 inhabitants per square mile; Germany, 382; Denmark, 223; France, 178, and even independent, self-contained alpine Switzerland boasts an average of 271 persons for each square mile of its rugged area. Even by dropping out one-third of California's area, representing less habitable lands, from consideration entirely, a population of twenty million would represent only 192 persons per square mile.

In post-war years, California's arms will be wide open to any enterprise which brings in capital from outside the State. The war has greatly emphasized the State's value as an industrial center and with the impetus given industrial expansion by the impact of war, it cannot be supposed that there will be any lack of private enterprise to take permanent root. New trade secrets, born under the duress of war, will be applied to both urban and rural development.

Private enterprise must, and probably will, have a free rein. Use of land must be stabilized and Government loans - not subsidies - give the war veteran an American chance to build up his own future. Love of the land and attachment thereto will be an



inevitable result of stabilized land use. With even more greatly improved transportation systems, the interurban way of living, so prevalent in California at present, will become a still greater factor in rural land development.

The following remarks are taken from a political address made in the summer of 1944 by California's forward-looking, popular war-time governor, Earl Warren:

"The choice of me as a keynote speaker was not made because of any personal attribute of mine....The only good reason I was chosen was because I came from the great, hopeful, energetic West. Ours is the youngest part of America....Growth and change and adventure are still a part of our daily life. In the West there is little fear of failure and no fear of trying....Certainly we are not here to look for a road back to some status quo. There is no status to which we could or should return. The future cannot be overtaken in reverse....

"We will have eleven million men out of uniform. We will have millions of war workers whose work has been stopped. We will have tens of thousands of business men whose contracts have been cancelled....

"But these young people will not be satisfied with just jobs. We will not^{be} satisfied either. These young people will want good jobs and a chance to get ahead. Hundreds of thousands of them will want to set up in small business for themselves; be their own boss; to have their own farm; to own their own filling station; to run their own store, or operate their own factory. We will see to it that they get that chance. We can see to it because we know what it is that makes jobs and opportunity."

Farming and Farmers

It is a far cry from the 100-odd human skeletons of white men forming Portola's expedition, who kept life in their bodies by subsisting on mule meat, to the almost eight million people and the billion and a half dollar food production of California today. The 200th anniversary of the raising of the Spanish standard over the site of San Diego which made California forever a white man's commonwealth is still a quarter of a century distant. When that anniversary date comes, on the basis of past growth and in the light of preceding history, will not California's annual food production have reached a two-billion dollar goal?

Assuming that by 1969 the predictions which give California a population of twenty million people by that time have come true,

based on a three thousand daily calorie diet, it will take approximately twenty-two trillion food calories per year to feed our own population alone, - a staggering pile of foodstuffs.

But in the interim how far must California share the responsibility with other food-producing states and nations in furnishing a 3,000 calorie daily diet to war devastated lands, until the people of such countries are able to bring back their own lands to normal peacetime production? The Axis forces are credited with having destroyed in Europe, even before the middle of 1942, eleven million cattle; three million horses; twelve million hogs, and eleven million mutton sheep, approximately one-third of the total pre-war numbers of such stock in the Nazi-occupied countries.

Certainly these peoples need millions of head of breeding domestic stock of all types to gradually restore their normal meat and animal fat supplies; their need for seed to plant their devastated acres is enormous, and millions of tons of cereals must roll from the new world to the old, until the ravages of war have been repaired.

By the time these needs have been filled undoubtedly new markets will have opened up under an international, world-wide plan of better food distribution. It is quite within the realm of possibility also that in reparation for the sufferings they have imposed on the world, peace terms will require the Axis nations to devote their post-war profits over a long period of time to the agricultural restoration of countries suffering from their depredations, thus farther augmenting the world-wide food market.

There may be a decided change in the nature of California farm crops in post-war years. Modern refrigeration methods promises to provide ample storage equipment of this type in the average modern home. If the housewives in other parts of the nation can purchase foodstuffs produced in their home communities - say, green peas, for instance - and place them in refrigeration against the day of use, without danger of depreciation in appearance or food value, the market for many early California crops can be materially affected. t.

Such products as strawberries or winter lettuce are exported from California to colder climes not capable of producing them till months later. Such crops, produced on high-priced California lands, can be grown on lands in other sections having a much lower value, and kept fresh almost indefinitely by modern refrigeration methods. This problem will probably challenge farmers and food processors, and possibly will be met by superior products of the same kind, the production of which is possible in California's more kindly climate.

There is little question but that production of California's special crops on which she has a complete or national monopoly will greatly increase. These include citrus fruits, dates, almonds, walnuts, figs, avocados and the like. There will undoubtedly be many new fruit crops, particularly of the sub-tropical type.

There are scores of varieties of avocados, a strictly California crop, and extremely choosy as to soil and climate. In various parts of the State tests are being made at present of a dozen or more varieties of this fruit, the supply of which is always far below the demand. Production of avocados in California may yet expand to equal, or perhaps exceed, that of her world-popular "Sunkist" citrus fruits.

Even granting the Utopian dream of a brotherhood of nations at least partially materializing, is it not likely that the lessons taught by war will be speedily forgotten - this time - and that naturally, our great democracy will trend more to self-sustenance? As indicated previously, in the field of natural rubber, investigations of guayule possibilities will probably develop a happy medium production on lower-priced lands. Even its production on the best type of land is economically feasible, and we find Congressman John Z. Anderson of California in June 1944 urging on Congress establishment of a series of 50-acre experimental guayule farms, pointing out that we are paying Mexico 34 cents a pound for guayule rubber.

That valuable fiber plant, ramie, may yet take its place as a substitute for the silk or hemp now transported from foreign sources half way around the world. Florida has already started big scale ramie production on thousands of acres in the Everglades section where this plant has proven its value as it did in California 60 years ago.

California offers great possibilities in the matter of much increased production of special and medicinal herb crops. In recent months, caraway seed, requiring for its best production well weeded cultivation and a climate free of summer rains and high winds, has proven its adaptability in Santa Barbara county. A biennial crop in Europe, the United States normally imported about six and one-quarter million pounds annually. Caraway seed, of a superior quality to the imported variety, was matured in its California environment in a single eight months season and returned good profits to the seedmen propagating it.

California can still expand greatly in field and forage crops, in livestock production, and in dairy farming. During the war years,

demand for milk and dairy products generally exceeded the available supply, curtailed by the shortage of feed and farm labor. There is little indication of lessening of demand for dairy products in postwar years.

There are millions of acres of California hill lands arable, yet unirrigable, which must be dry-farmed if used for crop production. Under summer fallow practices and conservation methods of farming these lands will give a good account of themselves in the production of cereals, mainly wheat, barley, oats and rye.

In the light of lessons learned by wartime production, wild land pasture can be made much more productive by rotated grazing; by machine removal of heavy brush cover on level lands and gentle slopes; by reseeding; by proper seasonal use, and by better utilization of dry feed.

In much the same manner as a small boy who would forego a piece of dry bread but eat the same with gusto when spread with syrup or honey, cattle avidly eat matted grasses on dry summer pasture when the unpalatable-appearing growth is touched up with a cheap grade of molasses, - and wax fat in the process. There is room for considerable expansion in this type of dry feed utilization, coming into vogue in California in recent years. In contrast to better utilization practices, there are still millions of acres in the State badly punished by overgrazing and premature pasturing. More intelligent use of pasture and range lands would greatly augment the State's production of beef, mutton and wool.

"Little Landers'" use of California lands is bound to greatly increase, resulting in heavier production of small fruits, poultry, rabbits and nursery stock. An ever-ready market has always existed for the last named, both for replacement of old stock and new development and this market will be intensified as time goes on.

Better Water Use

There is no question but that industrial and urban expansion in California and its resultant demands on the available water supply will, for a time, materially affect rural land use and irrigation. However, as has been previously brought out in this work, there is a sufficient water supply to eventually take care of all irrigable cultivatable lands - if the water is sensibly distributed and properly used.

California must guard against improper irrigation methods. Often under hit and miss irrigation, there is considerable waste of

water, and at present waterlogged lands are frequently found on heavy soils in some sections. On some California lands also, constant irrigation produces alkali conditions. To offset both waterlogging and alkalizing, there must be more control of the use of water through the medium of irrigation districts and other mutual cooperative or self-governing bodies which will have the necessary authority to insure proper crop rotation and other remedial measures.

Water management must take its place alongside and become part of over-all land management. We must begin to acquire the same knowledge of the potentialities and limitation of our lands as does the European farmer. We will be particularly obliged in future to pay much more attention to the upstream source of our water supply.

If a few hundred fishermen jeopardize the mountain water supply of a city of one hundred thousand people, or the irrigation waters of a thousand farmers, then the fishermen must be barred from the use of the water, on the basis of highest land use and the greatest eventual good of the greatest number of people. If, on the other hand, by the installation of structural improvements at a reasonable cost, anglers, - probably hailing from the same population center, - can use the water with impunity to the downstream supply, then the municipality or other water-using agency can reasonably be required to install such improvements as a general public benefit.

The eighteen State and Federal agencies submitting a joint report to Washington on the California-Nevada Region Post-War Program, in February, 1944, had this to say regarding water use:

"In water management the emphasis should be upon the closest possible regulation of the entire catch of water from the time it falls as rain or snow until it has performed an optimum of duty. Water differs widely from other forest land resources. Put to work, it loses nothing in substance, form or basic quality through continuing use. Uncontrolled, it may literally evaporate into thin air or it may become an agent of destruction. Water cannot be left alone; it must be regulated. It can be put to work or walled in so as to render it harmless or useless. Under the first plan it becomes an asset; under the second, a liability."

New Farm Lands

An approximate summing up of figures shown elsewhere in this history will indicate that only about thirty percent of the total land area of California is included in farms and that around

seven percent is actually devoted to harvested crops. Even with all the immense irrigation schemes under way, - the greatest Central Valley Project, the expansion in the Imperial and Coachella Valleys section of the Desert Region, and the many smaller projects in the State-wide water plan, - there will not by any means be a California farm for every returning war veteran desiring one.

Irrigation projects in California nearing completion, under way, or definitely planned, cover 4,400,000 acres. This is an area of land of the same extent as the States of Delaware and Connecticut combined. However, almost two million acres of the land to be irrigated by the new waters are already under some form of irrigation and the new projects are designed in part to provide supplemental and adequate water for these lands.

Two and one-half million acres represent new lands to be brought under water for the first time, and involve close to 20,000 new farm units. One hundred of these new farms, embracing 51,000 acres are in the North Coastal Region; 2,175 farms, including 90,000 acres, are in the South Coast Region; 5,450 farms and new land area of 693,000 acres are located in the Desert Region; 438 farms, involving 44,000 acres, are in the Mountain and Plateau Region, and the balance of the new farms and new land acreages are located in the great Interior Valley Region.

Gilbert G. Stamm of the Bureau of Agricultural Economics, engaged in a detailed study of California land and water use, brought out the fact in his wartime report that new irrigated farms operated by veterans will now spring into being overnight. The report of this land use specialist showed that while slightly over 8,000 of these newly watered farms are available to get under way in the immediate future, and the supplemental development for two million acres is also mainly a near future consummation, it will probably be a decade before the entire irrigated area will be in full operation.

Electrified Farms

New hydro-electric development is gigantic in its scope. With 86.7 percent of her farms already electrified, giving California third place among the states, - following Rhode Island with 92.9 percent and New Jersey with 87.1 percent of their farms enjoying this modern boon, - it can well be assumed that electric energy at a reasonable cost will soon be at the hand of every rural resident of the State. As a comparison, it may be stated that only 6.9 percent of North Dakota's and 9.8 percent of South Dakota's farms enjoy the blessings of electricity. Connecticut runs close second to California with 86.5 percent of her farms electrified,

and the State of Washington is among the leaders enjoying this rural convenience, with 80.1 percent.

Weeds and Insect Pests

Future California farming will undoubtedly be a happy medium between the soil using practices advocated in Faulkner's "Plowman's Folly," and the clean fields of yesteryear.

With the requirements of many crops and the yearlong growing season existent in most localities, weed growth in California makes rapid strides, and weed control is a major agricultural problem. While machine-operated equipment and the man with the hoe are the leading forces in the farmer's warfare against weeds, chemical treatment, particularly of the rank growth along roadsides, has long been practiced in the State.

The commonest weed control material has hitherto been one of California's versatile petroleum derivatives. When the demands of war made it necessary to divert every possible gallon of petroleum to battlefronts, not only were the food-producing farmers handicapped in the matter of weed control, but the rank growth of weeds along roadsides built up a tremendous rural fire hazard.

Chemists in very recent months have come to the rescue with a substitute for the petroleum base weed control oil. While little is yet known of this new product outside of rather restricted official circles, it promises to revolutionize future chemical weed control work in California, and without the necessity of drawing on the precious petroleum reserves. According to available information, the new product costs under fifty cents per pound and one pound manufactures approximately 100 gallons of the treating liquid. Against this, petroleum weed oil as used in treating roadsides, costs several cents a gallon.

It is too much to be hoped for, with constant air, sea and land traffic between California and all parts of the world under the hectic conditions of wartime, that new insect pests, crop, and tree parasites will not be introduced into the State, in spite of the best efforts of State and Federal quarantine agencies. The Japanese beetle, yet unknown in California, is fast leap-frogging towards the Pacific Coast. Some entomologists predict future major campaigns against this pest when it inevitably spreads beyond the Rocky Mountains barrier.

California may well need the efficient non-petroleum insecticides produced under the stress of war, including the new DDT, or gescrol, which in the process of its development, will undoubtedly become as equally effective against insect marauders of the orchard, field, and garden as it is at present against fleas, lice, mosquitoes and flies.

Land Holding Adjustments

One can predict with a fair degree of certainty that the men returning from the foxholes of the tropics or the slushy battlefields of Europe will insistently demand that the large California land holdings be broken up into small farm units for veterans' benefit.

As after every war in which we have been engaged, while there will be a noisy minority willing to rest for the balance of their lives on laurels won on the battlelines, the great majority of men leaving armed forces are stressing the fact that they want nothing handed them on a platter, but sufficient aid, justly due, to enable them to get a start towards a comfortable self-produced peacetime existence.

A considerable amount of land speculation and land booms would seem to be inevitable in immediate post-war years. There will unquestionably be Federal, State, and private cooperative land development schemes on somewhat of a colonization basis for men who want to wrest a livelihood from the soil. It is not likely that the errors of the Durham and Delhi State colonies (particularly, the latter) will be repeated, but that long and easy-term loans will substitute for Government subsidy or gift.

It is quite possible as time marches on that the amount of land use regulation necessary for the general good may reflect the statement of an English writer and lecturer who informed Californians that on a wartime basis - "In England a farmer farms efficiently or he is removed from the land, even though he may own the land outright."

In the growing competition of world trade, it is almost certain that the membership in farm cooperatives will greatly increase.

There will probably be a consolidation of many of these organizations among the hundreds now existing and other names identified with super-quality California farm products, somewhat similar to those of "Sunkist" and "Sun Maid," will also become world known. Regardless of future industrial expansion which may take place in the State, it can be safely predicted that California farmers will be agricultural leaders in a new post-war world.

Forest Land Management

In normal times the United States uses half the lumber, more than half the paper, and two-thirds of the wood-in all forms-consumed in the world. Mid-1944 found lumber one of the most critical of

all war materials, due to the fact that production simply could not keep up with local and world-wide wartime demands. California's sawmills and wood-working plants, in common with those of the balance of the nation, were working day and night in an endeavor to meet the unparalleled demand for wood products.

There are little prospects of any great lessening of demands on the State's timber resources for years to come and our local production will continue to be augmented by a considerable volume of imports as well. The fact that the annual timber drain on the forests of the State as against the annual growth was on a ratio of three to one even in normal times has been, of course, pretty well forgotten during war years when immediate war needs took precedence, almost regardless of future consequences.

In the redwood forests alone, embracing the heaviest stands of timber in the whole world, foresters found on a recent checking that 575,000 acres had been cut over in this unique timber belt, close to half of the entire virgin stand. Only 50,000 acres of these cutover lands are restocking well; 120,000 acres fairly well, and 405,000 acres are restocking poorly, or not at all.

Practically every board foot of redwood timber which will eventually go to market is privately-owned, as is also a large part of the best pine timberlands in the Sierra Nevada forests. Regardless of the fact that many timberland owners acquired their lands for a mere song, in the light of present day economic conditions, -taxes, market price limitations, expensive plants and equipment, and high wages - the private landowner, even if he desires to do so, can hardly give his lands the adequate protection which the natural resources on these lands demand.

Quick liquidation, with little or no concern by the owner as to the future of such lands, is often the only way out for the perhaps over-financed lumberman. In many cases, therefore, it is only just and fair that public monies be used for a certain amount of protection and guided administration of these lands, in proportion to the value they have to the public - regardless of actual ownership. As previously related, this factor has been more generally recognized in recent national legislation.

Granted that public financial aid is given the private timberland owner because of values intangible to himself except as one member of the body politic, is not the public justified in requiring certain regulated land use practices to protect the stake which the commonwealth as a whole has in these lands?

Timber mining, or stripping the land clean; inducing present fire risk, or leaving the lands in a condition to create future fire hazards; poor logging methods; and poor cutting practices generally, should be made the subject of legal requirements, just as much as in the case of legally forcing the orchardist to spray his trees to prevent the insect pests which they harbor from spreading to his neighbors' groves.

To avoid the ghost town relicts of mining days and to stabilize the use of timberlands on the same basis as farmlands, it must be only a matter of time, for instance, until general public interest demands that a logging unit of say half a million acres of timberland be cut over by selective logging methods at certain time intervals rather than by one clean sweep operation, whether such land is public, private, or an intermingling of both. Some lumber concerns are already following such practices - many are not.

The new uses of wood and forest products touched upon in preceding pages, will have the effect of helping stabilize forest land use. The products of those species of trees at which lumbermen have turned up their noses in past decades will take their place in the world's markets alongside the almost incomparable redwood, sugar pine and ponderosa pine and Douglas fir.

Laminated wood products; the new war plywood; wood plastics, and a host of other forest products, undreamed of in the days when Paul Bunyan and his associates could see no end to America's virgin forests, will play their part in many new fields. Wood, renewable by nature, will greatly replace metals which when once harvested, as a natural resource are gone forever.

It has been previously asserted in these pages that the United States Forest Service strongly favors private enterprise in the lumbering business, and in other forms of land use. The authors again quote Lyle F. Watts, Chief Forester of the United States, on this subject, as he tersely stated in a recent public address:

"During depression years the Government was forced to shoulder in on private enterprise to keep business alive. Ditto in wartime to maintain almost unbelievable powers of production which doubled in four years. Such a thing as a laissez faire policy on any form of land use cannot be maintained."

With increasing population and increased land use, stricter rural fire regulations must be imposed, in field, woodland, or mountain areas. Certainly fire restrictions are still too indulgent when one county alone reported 642 rural fires in 1943, this without including any fires on over one-third of the county's area.

Conservation of natural resources and the rural land fire prevention problem already have a place in California's school curriculum. Undoubtedly, its status as a "must" subject will be greatly stepped up in the future to inculcate in the student not only a love of the land itself, but a definite sense of individual responsibility for its proper use.

Watershed Protection

Water needs and a stabilized water supply is such a leading economic factor in California that the responsibility for taking better care of our forests is doubly great -- if the present generation has any obligation at all to future California citizens. This problem is in its lap right now.

As previously recounted, a large area of California's forests are not forests at all in the common acceptance of the term, but areas of chaparral guarding water supply for many municipalities and prosperous farm sections. Experts agree that some of these areas have a value as high as \$950 an acre. Excluding municipal water supplies and considering only the annual value of the crops produced on dependent agricultural lands, many of these brushland areas represent a value of \$200.00 an acre, and up.

Because of the water-storing functions of these lands they should be and generally speaking are, in public ownership. Far from adequate protection is yet being given them. It would seem on the basis of valuation figures alone that \$1.00 per acre, per year, would be a small price to pay for the protection and administration of these lands, but on millions of acres an infinitesimal part of this sum is being expended at present -- a matter of a few cents per acre only.

Constant pressure is being brought on the public guardians of chaparral watershed lands to plant real forest trees to replace the present dense shrub growth. Negative results of experiments along this line have been previously detailed in this work. There are, however, many brushfield areas in California which could be planted to coniferous forest trees with some guarantee of success.

Layman exponents of reforestation glibly talk of planting millions of acres of forest trees, with little real knowledge of the immensity of the job involved. Minimum forest planting requirements call for 600 to 700 tree seedlings per acre; a million acres, therefore, would mean at least 600 to 700 million trees.

In average mountain country it takes a pretty husky man to plant 300 trees per day, so that the planting of a one-million-acre

miniature forest runs into a total of two and one-third million man-days. With a 50-day planting season, this would take an army of almost six thousand men eight years to create an embryonic, million-acre forest, and this involves merely the operation of setting the trees into the ground. Back of this is the collection of seed, the propagation of trees in nurseries, the distribution of nursery stock and related activities. A full-fledged baby pine forest of any magnitude cannot by any means spring into being overnight.

Post-War Work Plans

Almost every newspaper and magazine is full of printed matter concerning the stockpile of jobs for the post-war period necessary to avoid the economic depression which might result from idle manpower during readjustment years. From the legislators and the heads of Government departments in Washington down to the round table group in the tiniest hamlet, everyone is concerned with post-war labor problems.

Certainly there is no lack of worthwhile development and protection work demanding attention in California's forests, without resorting to the leaf-raking jobs sometimes marking work on public properties during the depression years of the thirties. The publicly-owned national forests of the State, covering some twenty percent of California's total land area, offer a stupendous stockpile of work which will return profitable public dividends, both within the near and distant future.

Quoted from the Congressional Record of the 78th Congress are the following statements made by Senator Dennis Chavez during the work of the Senate Committee, struggling with the post-war national forestry program:

"During the hearings, the committee brought out that wartime demands have put a severe drain upon our forest and range resources, vast areas of which even before the war, were in bad shape ---The hearings also brought out that in the great unemployment period of a few years ago the Forest Service ---- did a magnificent job in cooperation with the States in providing highly useful work on our forest lands for thousands of CCC boys and others badly in need of work ---- The forests of the nation are the greatest resource of the people of the United States."

On the call of national post-war planners, the California Region of the United States Forest Service on March 31, 1944, submitted to Washington rather detailed post-war plans of needed development and recurrent administrative and protection work on the national

forests of the State, plans which have been blue-printed in the months since.

The Forest Service post-war plan was broken up into two sections; an immediate or "three-year" plan to provide for pressing development needs, and an "ultimate" plan, not tied down to any period of time. The ultimate plan was defined as "The best essential attainment of lands under the form of use for which they are best adapted considering all factors, soil, climate, water and human needs - social and economic." The immediate, or three-year plan, represented 10,698,000 man-days of work; the ultimate plan, 31,890,000 man-days employment.

This post-war plan covered the whole range of Forest Service activities, fire control; timber management; range management; water management; recreation; general land use, and general administration. The plans for work to be accomplished included that on lands in the process of acquisition from private land owners, this acquisition of other lands which would in the process of time become part of the public national forests, a good deal of which represent cutover lands to be exchanged by private operators for Government stumpage, would add 5,272,500 man-days work to be the ultimate program.

The biggest immediate need in California's public forests is more adequate fire control. The preliminary plan included fire hazard reduction work on five million acres; the construction of several hundred buildings-- garages, barracks, storehouses, and the like -- to serve fire protection personnel; 63 landing fields for planes used in transporting firefighters; 890 airstrips in strategic locations for helicopter landings; completion of the remaining 15 percent of the previously-planned communication system which means 4,565 miles of pole, and 5,460 miles of tree telephone line; the construction or betterment of 800 miles of major firebreaks, and and 1,080 water facilities along truckways.

The Forest Service fire control program is designed to reduce all known human fire hazards to an absolute minimum; make quick detection, or fire discovery, as nearly perfect as possible; provide instantaneous communication between detection facilities and fire suppression forces; join firebreaks to natural topographic barriers, and to provide as rapid transportation of man-power to the point of need as the nature of the country will permit. The plan is based on an ever-increasing use of water and heavy machinery in actual forest fire control work.

In taking stock of their ground transportation system, all the California Federal foresters had to do to present post-war needs

to Washington legislators was to transfer their figures to the new summary, since for years the Forest Service had had an overall adequate transportation plan, kept up to date to fit in with modernized air transport.

A checkup showed 2,815 miles of construction or betterment of fire control roads on national forests was an immediate need, fitting into the three-year plan, with an ultimate need of 5,630 miles. The Forest Service plan also showed 2,158 miles of all-purpose roads needing immediate construction or betterment, and 17,983 miles of these all-purpose roads coming under the head of ultimate needs.

The present national forest trail system in California, long since planned in areas where truckways are impossible or uneconomical, embraces a total of 22,673 miles, of which 11,961 miles are in an unsatisfactory state, and 2,940 miles non-existing. The Forest Service ground transportation summary also showed 1,860 road and trail bridges needing replacement.

Insect control is provided for in the post-war plan on 880,000 acres. Originally the plan contemplated Government logging on a salvage basis. In the light of experience in pre-war years the Federal foresters were convinced that they could log and clean up widely scattered areas subjected to the attacks of the Western pine bark beetle, an accomplishment which was almost impossible for private concerns before the war. Under the plan the merchantable logs would be sold to lumbermen and by this method pine bark beetle control would pay its own way. This had the blessing of the industry, subsequently, however, the trend of stumpage prices and the demand for timber has indicated that private industry can do the entire salvage operation under sales contracts if given proper price incentives.

There can be no temporizing with the White Pine Blister Rust plague, the fight against which, as previously stated, has been carried on even during the war years. The Forest Service post-war work plan involves carrying on white pine blister rust control work on 1,213,400 acres under the three-year section, and on 3,473,000 acres under the ultimate plan. Unless the war on this imported parasite is carried on to a final victory, the splendid sugar pine forests of California are doomed to extinction.

There is no question relative to reforestation needs in California and the public outcry for more tree planting is amply justified. Statements in preceding pages have indicated the magnitude of the task of tree planting in wild land areas. The Forest Service listed reforestation work as a major post-war activity starting

immediately, and building up in succeeding years and decades to an estimated maximum of seven million acres.

After the little trees are planted there is still the problem of proper care of the plantations. To give the young trees a chance to establish themselves, they must have a measure of protection against gophers, squirrels and other rodents; firebreaks in many cases are necessary, and some of the areas must even be fenced.

That prickly rodent enemy of young pine growth, the porcupine, is in some forest areas a distinct threat both to hand planted trees and natural reproduction and the Forest Service post-war plans indicated porcupine control measures on approximately one and one half million acres of mountain lands.

Timber management post-war plans on the public forests include timber culture practices on 1,120,000 acres within three years, and similar work on 3,320,000 acres as an ultimate aim. This involves thinning of dense young timber stands to accelerate tree growth; artificial pruning to produce a higher percentage of better grade lumber; development of special Christmas tree areas to keep up with the increasing demand for this forest product. One of the projects planned embraces special treatment of areas of white fir to reduce the number of defective trees usually found in stands of this common California species, gradually being more generally utilized in the State's lumber trade.

In connection with range management, the national forest job stockpile listed 275,000 man-days work under the three-year plan, and 480,000 man-days labor as an ultimate need. Range management plans run the whole gamut of improvement of mountain pasture lands including eradication of poisonous plants; rodent control on open meadows and grasslands; reseeding of poor or overgrazed ranges; construction of drift fences, cattle guards, and stock driveways; and livestock water development.

One of the reasons why Germany's blitzkrieg in Europe was so successful was due to her possession of maps, accurate to the last minor detail. When our own nation was drawn into the bloody vortex, one of the first demands of armed forces was for accurate maps, particularly of seaboard states. In presenting its post-war plans, the Forest Service estimated that to secure complete map coverage of the national forests of California and adjoining lands by modern mapping methods would require 450 man-years on the basis of a three-year program, and 750 man-years on the basis of ultimate needs.

As heretofore emphasized, the United States Forest Service as an organization stands squarely behind private enterprise and seeks

no land additions unless such can best be handled as public forests. It does not advocate additions of even purely watershed protection lands if such are already being adequately protected by water companies or other public service enterprises. It is inevitable, however, that large areas of private cutover timberlands will revert to public ownership. There are also the millions of acres intermingled sub-marginal farmlands granted to individuals under past liberal land laws and now mainly abandoned or ill-used, lands which can reach their highest use as public shooting and fishing grounds; in timber or forage production, or as conservation areas for the State's much needed waters.

The national forests of California represent an almost limitless stockpile of post-war jobs in their administration on a happy medium basis between the hand-tended forests of Western Europe and the policy of past years which has relegated them to a place in the picture very much out of proportion to their value in the State's economic existence.

At the present time, these public forests, including purchase units, owned by all the people of the nation, contain a gross area of 23,815,000 acres and, after eliminating intermingled private and State land, a net area of 19,660,000 acres. Federal forestry officials tentatively figure that some 3,800,000 acres may be added within three years and perhaps a still further six or eight million acres under ultimate land use plans.

In their post-war planning, the Federal forest officers of California based their figures on the employment of a total of 20,000 persons per year. Of these, it was estimated that 5,000 would live at and work out from their homes because of the nearness of much of California's forest land to populous centers; 3,250 workers would live in 25-family capacity villages or in tent camps within Saturday night reach thereof; 5,000 employees in portable houses located for relatively long periods of time in small areas, and 6,750 single men would be housed in barracks quarters.

California, with her far-flung area of rugged forest lands, has not yet quite figured out the stabilized employment which these wild lands might afford. Foresters in the Southern States, studying post-war possibilities along this line, produced well authenticated figures, showing that 10,000 acres of well-stocked forest land, productively utilized, would provide full time employment for 166 men in woods work and manufacturing plants. Their studies showed that in addition to this stabilized employment, 2.3 man-hours per acre, per year, would be needed for fire protection, **forest** management, road maintenance, other improvement work, and general land use supervision. Much of California's forest land

with more diversified use, would undoubtedly show a still greater volume of potentially permanent employment.

A Possible Land Army

During most of the near decade of existence of President Roosevelt's Civilian Conservation Corps, one of the main fears of the average citizen was that this youthful land army would develop a military complex. In spite of all the efforts of administrators, much of the Army's discipline did creep into and permeate the ranks of the CCC, a fact for which the same average citizen is profoundly thankful today. The boys who learned individual discipline and collective cooperative action while absorbing the rudiments of forestry, biology, entomology, engineering, and other outdoor professions connected with land use, found it of incalculable value later when they had exchanged an axe for a bazooka, and a shovel for a Garand rifle.

Faced with the combined need of a citizenry with a background of military training and better care of our public lands and natural resources, is it not logical that a national land army will be brought into existence, patterned somewhat after the Civilian Conservation Corps?

Will not youths between the ages of 18 and 21 be much better off themselves for a year or two of disciplined camp training in rural sections on a fifty-fifty basis of work on public lands and instruction in military tactics? The field in California alone is almost unlimited. The United States Forest Service, Park Service, Soil Conservation Service, Division of Fish and Wild Life, Bureau of Reclamation, the State Division of Forestry and other Federal and State land administration agencies offer an endless list of worthwhile projects to be underwritten for immediate or eventual public benefit. Granted that the military training may be demanded or offered in any case, there is the additional worth of the work accomplished plus the value of a period of outdoor, regimented, disciplined life to the future citizens themselves.

It is repeated, that to keep land use in proper balance, our forests and wild lands must be more adequately cared for proportionately to the value they bear in relationship to the lands producing needed human food, and to the urban centers which men have built in the modern way of living.

California's Mineral Wealth

In few areas of its size in the world is the general geologic formation better known than in California. While some new discoveries will undoubtedly come, the mineral deposits of the State

are pretty well catalogued. These are as varied as its agricultural products or its tree growth, since 400 different mineral specimens have been identified, forty of which have not been discovered elsewhere. While many of these minerals merely find a place among curio collectors' specimens, seventy different kinds are commercially produced. Every one of the 59 counties of the State have commercial mineral deposits of one sort or another.

The 51-million gold harvest of 1939, when thousands of unemployed were re-washing the pay dirt of the old mining regions, will probably never be repeated, yet there are still uncounted millions of yellow gold deep in the earth of the established mining districts, and it is quite likely that post-war years will witness stabilized production of gold to the amount of thirty to forty millions of dollars annually when the big gold mines now closed for the duration return to their pre-war prosperity. While mineral experts foresee the end of high grade copper, lead and zinc ore within the next three or four decades, it may well happen that substitutes will be found in California's varied mineral field to form amalgamates to take their places.

Silver production will probably remain fairly static, and manganese ore, quicksilver, tungsten, and similar critical war materials return to their pre-war status of production. Undoubtedly, the slump in the production of such metal will not be so great as that following shortly after World War No. I due to the heavy demand for new and improved articles used in daily living.

It is almost certain that structural minerals, particularly cement, will remain at a high production level in view of heavy construction and development work promised in post-war years. There seems to be no limit to the supply of native cement available and this valuable material, so widely used in all types of construction work, will lead in the field of so-called structural minerals. It will be recalled that the production of California cement reached a total of almost 35 million dollars in 1941.

With the advent into the realm of general public use of many war-born conveniences, the mining of industrial minerals ranging from bentonite, limestone and gypsum to pottery clay, silica and sulphur, will be greatly enhanced. Mineral water, placed by mineralogists in this class, - the output of which was well over 16 million gallons in 1941 - can confidently be expected to greatly increase in volume of production in post-war years.

In the field of borates and salines, California will continue to lead the nation. There is practically no limit to the supply in sight of those mineral deposits which produce borax, salt, soda and kindred products, common mainly to the Desert Region of the State.

The future of California's immense petroleum industry seems to be most anyone's guess. Opinions of experts range all the way from the prediction that California's underground oil pool will be pumped dry in twenty, or even ten years, to those of the more optimistic who say that the underground supply will last for many generations yet.

Geologists, now plumbing to depths of 15,000 feet in the bowels of the earth may uncover great untapped reservoirs of oil and unquestionably will discover some new sources of supply altho generally conceded that the matter of bringing in great new oil fields is somewhat of a gamble. The unprecedented use of oil during war years has brought home the fact to everyone that petroleum resources are not by any means limitless. Some oil experts bank on the possibility of greatly increased supplies by the deeper drilling methods, and many of them agree that the potentialities of tideland oil production in California have by no means yet been fully realized.

Because of the abundance of oil gushing from California wells in pre-war years, no great attempts were made to produce true petroleum from oil shale. Chemists are now concentrating their efforts on this source of production in real earnest. While the quality of oil compares favorably with that pumped from wells, so far the cost of extracting has been too high to make large scale operations commercially profitable. Experiments at present under way indicate that eventually processes will be developed whereby tremendous oil supplies will be economically produced from quarries rather than from wells.

There are immense quantities of this oil shale in California - literally mountains of it, in fact - as a possible source of future motor fuel. This native oil shale is quite widely scattered, geologists crediting the greatest deposits as existing in the six counties of Kern, Ventura, Santa Barbara, San Luis Obispo, Santa Cruz and Mendocino.

The legal restrictions imposed on natural gas production some years back have resulted in reducing the waste from an amount representing 50 percent of the actual production, to five percent. There is little need of worry for generations to come of any shortage in this leading California resource, even in the face of ever-increasing demands.

With the return of gold to the status which it never really lost as a world monetary standard; the continued, even if restricted, production of natural petroleum and the development of shale oil production; with greater commercial use of war-born alloys; heavier demands on industrial minerals and products of the borates field; and with the inevitable heavy programs of post-war con-

construction of all kinds calling for native structural materials, it is quite probable that California's mineral production will reach new heights. The near 450 million-dollar harvest of the State's mines and quarries marking the 1943 yield may well run to an annual output of half a billion dollars in the near future.

Recreation, Fish and Wild Life

Every present indication points to the fact that even the hordes of tourists which stormed California in pre-war years were but a drop in the bucket to the influx of travellers which may be expected to invade her boundaries when immediate post-war problems are settled and normal living conditions again prevail. The removal of wartime travel restrictions presents an opportunity to hundreds of thousands to realize the suppressed desire to see for the first time that much vaunted State. There will be many other thousands, deprived by war restrictions from following their usual custom of annually wintering in the State, who will return to their habits of pre-war years.

Californians themselves are great travellers. Thousands of residents of the Mountain and Plateau Region spend all or a portion of the winter months amid an atmosphere of oranges and roses, not common to their own section of the State. Analogously, many residents of the hot valley sections spend as much time in the mountains during the summer months as their business interests and pocket-books will allow. A checkup of any popular tourist center in pre-war years would disclose the fact that by far the greater majority of the tourist cars carried a California license plate even though there would be a good representation of automobiles from the other 47 states.

Passing over the many urban tourist attractions offered by cosmopolitan San Francisco and its environs, the expanded Los Angeles metropolis with its Hollywood atmosphere, and other populous centers noted for their uniqueness, one can easily list a few of the leading rural tourist attractions. The miles and miles of citrus orchards with their fragrant blossoms, pendant yellow or orange fruit, and their flower-embowered farmhouses, constitute a rural landscape of which the out-of-State visitor never tires. Accessible ocean beaches are open almost the year around here and there along the State's 1200-mile coastline. The chain of old Franciscan Missions, some located in distinctly rural settings, are an unique tourist attraction found in no other place in the country. Their warm summer climate in winter, with the additional attraction of hundreds of square miles carpeted with brilliant wild bloom, will again draw thousands to the flat desert areas.

A desert resort like Palm Springs, patronized by the elite of the world, and an unique combination of high-priced hotels, hot dog stands, sanatoriums, metropolitan shops, and wide open desert spaces, can perhaps be found no place on earth except in California. Here in the dead of winter, tourists may ski, ride, hike, dance, golf, dine on caviar - or hamburgers, - dressed in costumes usually associated with a humid summer seaside environment.

One extensive resort in the heart of the southeastern desert area, catering to the common or garden variety of tourist, for years in pre-war times advertised free board and lodging to patrons for each day the sun did not shine. The sun rarely failed to do its part, and few guests collected.

The great national parks of the State, with their widely-planned post-war development, will be a Mecca for new thousands who wish to see for the first time the wonders of the great Yosemite mountain area, the largest and oldest trees in the world, and the only active volcano of which the nation can boast. The great redwood groves, the tourist show area much of which has not been preserved in its virgin state for posterity, will again prove a drawing card for hosts of tourists from all parts of the nation and the globe.

Sharing in the large accumulation of funds in the State treasury, will be the State Park Service in the development of its own extensive system of parks, work on which was barely started in pre-war years. With work already under way, the California State Division of Highways is planning on the expenditure of millions in post-war years, for the betterment of existing travel routes and the extension of the State's highway system.

With the promised increased use of airplanes for business and pleasure travel, millions will use this mode of transportation to reach California in post-war years. Leading airlines in the State already have ambitious plans for post-war expansion, with recreation travel as one of their features.

To those who prefer back country travel, unmixd with modern methods of transportation, the national parks offer vast areas from which man-made improvements are banned other than those which contribute to the "roughing it" type of outdoor camping. In the national forests also, 1,639,000 acres of mountain land is preserved in primitive or wilderness areas, free from encroachment of roads and similar improvements.

California is truly a tourist state. Every indication points to the fact that the State's tourist trade will shortly gross a cool billion dollars annually, even greatly exceeding her lumbering and

mining, and representing an income one-half as great as her predicated agricultural production.

In pre-war years the demand for improved camping and recreational facilities on the national forests of California greatly exceeded those available. In 1941, improved campgrounds could take care of but 38 percent of the people seeking such accommodations. The heavy recreational demand is somewhat indicated by the figures on national forest visitors, cited in previous chapters.

In their post-war development plans, Forest Service officers estimated 652,000 man-days employment as needed in the development of national forest recreational facilities within the first three post-war years, and 1,565,000 man-days as an ultimate aim in providing for public outdoor mountain recreation.

The long list of public needs for the national forests of the State along this line included 34,000 camper or picnic units, as against 10,480 in place at the present time; 200 organization camps for the use of Boy Scout troops and similar bodies; 2,500 miles of recreation trails for hikers and horseback riders; 285 tourist pastures; 50 high country shelters; 750 acres of lakeshore clearing for the benefit of bathers; 30 water development and distribution projects, and five million specially-planted trees and shrubs.

To serve the greatly growing demand for winter sports areas, the national forest managers listed 5,000 acres of ski playfields; 1,000 miles of ski trails; 50 warming shelters, and 75 improved automobile parking areas. It is but a few hours drive - in some sections of the State but a matter of minutes - from populous centers to areas of deep winter snows, and even in war years a local snow-hungry public were insistent in their demands for public winter sports areas. With the increased leisure of post-war years this use of the mountains will be greatly accelerated.

The Forest Service estimates set forth that forty percent of all recreational improvements on the national forests were an immediate need. These improvements, so strongly demanded by the outdoor recreational public, were in addition to the development in connection with other forest activities, some of which would contribute materially to recreational enjoyment of public forest areas as well. The major purpose of a water development project, for instance, might be fire protection, yet the same project could also be made to contribute largely to the recreational use of the area in which it was located. Multiple use of land and water, so far as one use was compatible with the other, was always kept in the foreground as the basic principle of national forest use and development policies.

Fish and Game Resources

A love of hunting and fishing is inherent in human nature and particularly so in the American stock which a generation or two back could help itself freely to the wild life resources of the Western lands even to the point of gluttony and waste. Thousands are gloatingly waiting here and overseas for normal conditions to return so that they may enjoy again their favorite sport.

Great strides have been made in fish and game propagation in California. Approximately twelve thousand miles of fishing streams exist in the public national forests alone, and the immense program of water development now under way will provide angling waters of still much greater extent. As formerly stated, the State Division of Fish and Game have already launched a program of more small hatcheries close to the waters to be currently restocked, and post-war hatchery development will witness millions of sport fish released in California streams and lakes, already of sufficient size to take the angler's lure or fly.

The Forest Service post-war plan in the matter of their three-year program alone, includes some 200,000 man-days employment in fish and wild life betterment on public lands, much of which will be for the clearing of ponds and stream channels, for check dams, elimination of barriers to spawning fish, and other improvements designed to better the sport of angling.

The multitudinous volume of sea life in California's coastal waters which so amazed the first Spanish explorers will not only continue to contribute scores of millions of dollars to the State's gross annual income, but sport sea fishing will increase in post-war years. The banishment of thousands of Japanese fishermen, harvesting almost countless tons of sea food to feed the empire of the rising sun, has already resulted in the increase of several species of coast water fish, in spite of the big contribution this resource has made in recent years to the national and world-wide food supply. Increase in marine life in immediate future years is also assured by the general closure of coastal waters to sport fishing for the war's duration.

More public shooting grounds are needed and post-war years will undoubtedly witness great reduction in the area of public lands now included in game refuges. With other forms of game protection a standard practice, there is ample wild land in California - forest, grassland and marshland - much of it in public ownership, to provide hunting grounds, both for California's large resident nimrod population and for outside tourists desiring to indulge in this form of sports.

More game farms for the propagation of upland birds is in the offing. Game farms as a matter of private enterprise, and not on a volunteer basis, will possibly supplement the State-controlled ventures of this nature. The proven success of the introduction and propagation of the pheasant species alone attest the possibilities along this line. Fur farms, in areas naturally adopted to this activity, - enterprises greatly curtailed in war years - loom as a profitable future line of industry. More feeding grounds for migratory birds are also indicated in post-war plans.

The deer population of California is much greater now than ten, twenty, or thirty years ago. In many sections the animal is a nuisance to growing crops and orchards; in some areas range needed for domestic stock is greatly depleted by browsing deer; in some places deer are even a menace to traffic on highways traversing wild land areas. Hundreds of thousands of hunters, on the other hand, will spend almost unlimited cash for an opportunity to bag one of California's largest game animals.

Much of the habitat of deer consists of forested or watershed cover lands on which the fire menace is so great that large areas must be closed to general public use during the standardized hunting season. Thus the sportsmen are robbed of their sport and agricultural interests suffer from deer depredations. This matter will be a leading wild land use problem for a number of years. The killing of does in some districts much in the same manner as has been carried on in over-populated deer areas in other states is a probability within the near future.

Some happy medium which takes into consideration the scientific principles of deer herd management and the high degree of rural land fire hazard, must be worked out in the post-war years to insure the harvesting of an annual deer crop. Deer now range naturally over 45 million acres of California mountain lands as well as on practically every other type of property. In some sections they are almost as approachable as domestic range cattle.

The membership in local, State, and inter-state sportsmen's organizations is constantly growing. While these organizations are permeated with a certain dash of conservation ideas, the bulk of the membership are prone to see only their own side of any question, and to construe granted privileges as vested rights. In rural land use, the sportsmen's class must expect and abide by the same measure of restriction as is imposed on farmers, stockmen, lumbermen, miners, and other types of land users. As it is at present, many of them are city men who resent any form of restraint while disporting themselves in the outdoors.

Fish and game is one of California's greatest assets. Fish and wild life problems are yet far from being solved for the greatest good to the greatest number of people for all time. For the best conservation and use of this great resource and for the best interests of present and future sportsmen, there must be less cumbersome control; less tying of the hands of the biologists and the administrators of the resource by legislative action; much more elasticity of action allowed a representative State Board of Fish and Game commissioners.

The ideal State board dealing with this leading land use problem would probably be one composed equally of representatives of the sportsmen and of tried and true conservationists, with power to act currently in the establishment of bag limits, opening or closing of seasons and use areas, and in imposing restrictions currently needed to keep sensible use of fish and wild life resources at the right level to maintain a proper balance with other forms of land use.

It took almost half a century to satisfactorily establish California's mining land use; three-quarters of a century to fairly well adjust her water problems; forestry and wild life conservation and use are comparatively recent issues - perhaps to be adjusted more quickly because of the rapid pace set by the tempo of war.

Conclusion

In considering future California land use, one cannot think in terms of people wedded to the land for centuries, some since the dawn of the Christian era, or before. In comparison with older lands, California is still glaringly new.

One can again appropriately quote the officers of the Forest Service, who, in presenting their post-war plan of public forest land use stated that:

"The dependent population of California is the most heterogeneous of any section of the country, ranging from the pioneer descendants of the mountain counties of the north to the various cults and isms so common to Southern California, and including every combination of social and economic levels."

California! What of the future? California is hungry for development.

In spite of modernization and any industrial development of post-war years, California will increase her rural production and retain much of her rural charms. She will carry into the future a

certain measure of the peaceful pastoral influence of the old Franciscan Mission; something of the swashbuckling, adventurous spirit of the Spanish cavaliers; part of the romance and color of the Mexican Californios, and a lot of the simple, land-loving independence of the covered-wagon pioneers. Rural California will long continue to be a mixture of a little bit of all the old nations of the world, and a lot of all the other States of the Union, rolled into one Pacific Coast Commonwealth.

robably this history can best be concluded with the following extract from an article written in late 1943 by Donald Culross Peattie, leading American and California author, for the Office of War Information; translated into the language of sixty nations, and distributed over the entire globe:

"For the land itself still breathes of youth. Our cities are young; our soil is young. Even our wilderness, a little of it is still left to us - snowy mountain ranges and forests of great redwoods thousands of years old, deserts where only the wind talks and the sun smiles."

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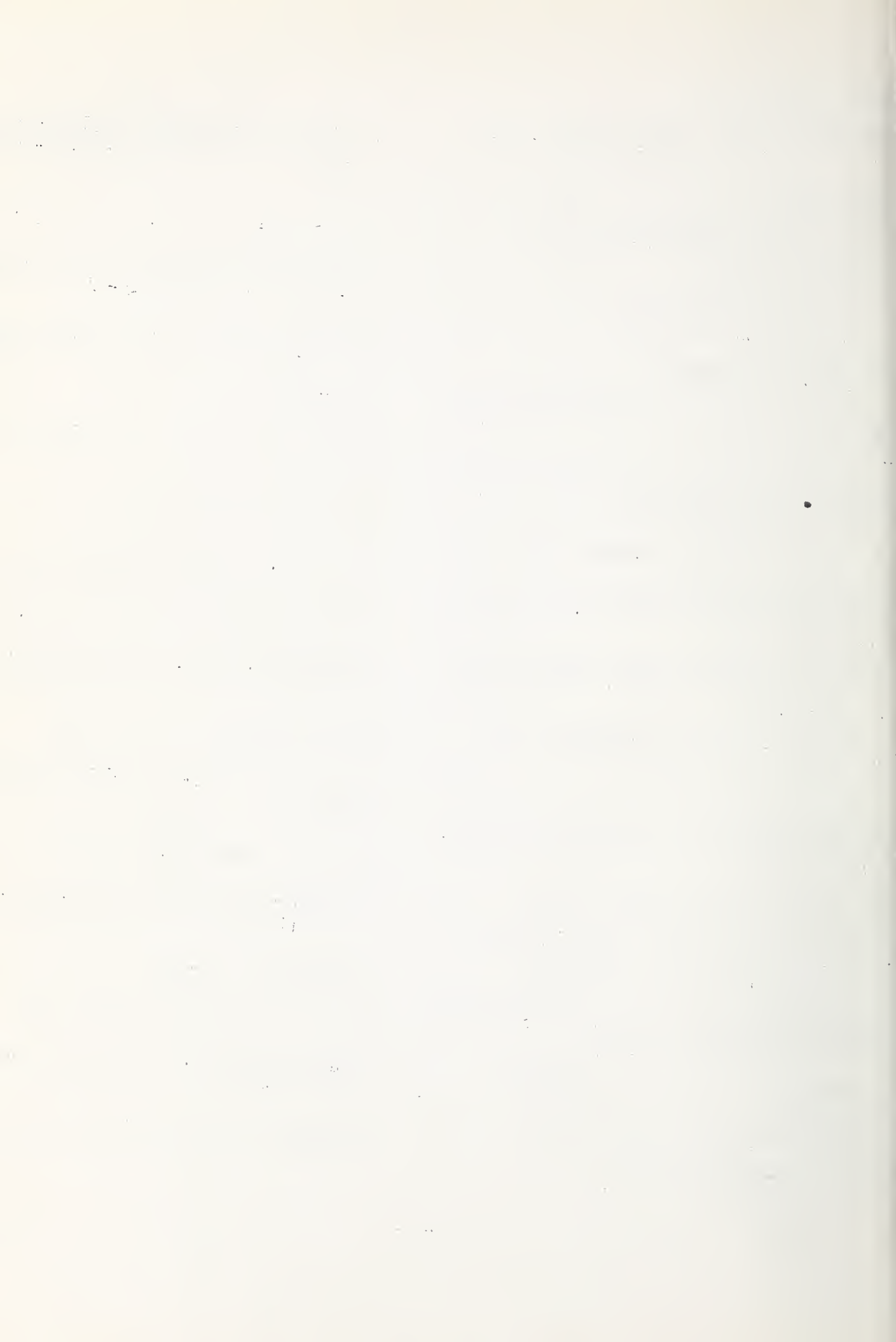
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